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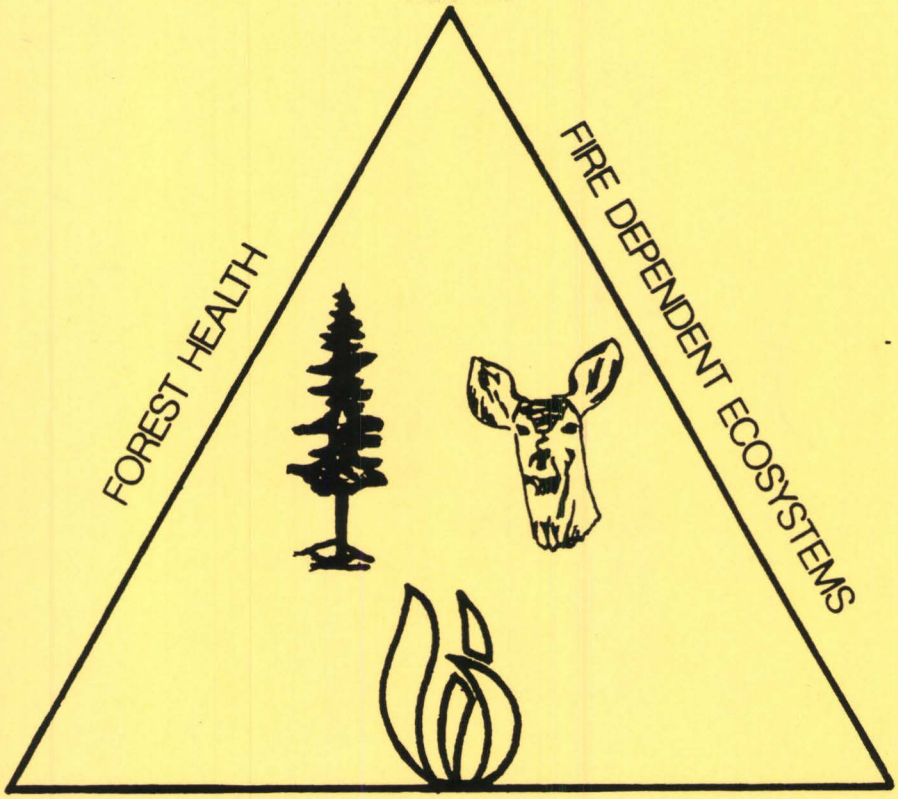
PRESCRIBED FIRE
MONITORING AND EVALUATION



BECKWOURTH RANGER DISTRICT

PLUMAS NATIONAL FOREST

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PRESCRIBED FIRE EFFECTS MONITORING AND EVALUATION

BECKWOURTH RANGER DISTRICT

PLUMAS NATIONAL FOREST

1993

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ABSTRACT

This paper documents a prescribed fire monitoring and evaluation process to evaluate prescribed burns on the Beckwourth Ranger District, Plumas National Forest. This process was developed to accurately measure prescribed fires effect on fuels, timber, wildlife, soils, and future wildfire potential. This process provides quantitative and qualitative information to compare those effects to the desired resource and burn objectives stated in burn plans, and provide a basis for programmatic adjustments in the District's fire re-introduction and prescribed burn programs. Beckwourth Ranger District's process involves establishing a 20 x 50 yard plot and includes: 1) inventorying dead & down vegetation; 2) photographing; 3) inventorying brush by species, plant condition, and response to burning; 4) inventorying trees by species, size, crown ratio, DBH, height and defect; and 5) inventorying downed logs by soils/wildlife classification. Plots are established and inventoried prior to burning, observations are made while burning, and inventorying is accomplished for a number of years following burning .

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PRESCRIBED FIRE EFFECTS MONITORING AND EVALUATION

BECKWOURTH RANGER DISTRICT
PLUMAS NATIONAL FOREST

1993

PURPOSE

This monitoring system was developed in an attempt to provide a relatively simple, accurate, and easily implemented way to monitor effects of prescribed fire on several components of the ecosystem. The intent of this process is to:

1) Accurately measure post fire effects of fuels, timber, wildlife and soil to compare those effects to the desired resource and burn objectives stated in the burn plan.
2) Obtain valid pre and post prescribed burn information for training, educating the public, and for agency personnel to develop support for program expansion.
3) Provide information for making programmatic adjustments in the District's fire re-introduction and prescribed burn programs.

This process was fashioned from the National Park Service "WESTERN REGION FIRE MONITORING HANDBOOK, 1990". It became obvious that the methods in the NPS handbook were more meticulous and involved than we desired and geared more toward an agency standard than was our intent. Most aspects of this plan were designed in the office, then adjusted during implementation in the field to provide the most practical and "user friendly" application to meet our needs.

This included supporting inventory, data and calculation sheets with completed examples. An attempt was made to provide as much of the inventory or calculation process, for each step, on each form, so that the field personnel wouldn't need to carry additional references. Work is being done with Corvallis Microtechology to develop compatible software to be used with the CMT field data recorder for increased ease in data collection.

Helpful Hints - 1 person should be placed in charge of: a) organizing data gathering, b) insure documentation for quality control, also consider using multiple colored copies to readily separate pre and post information. Green paper for pre burn information and yellow for post burn information.

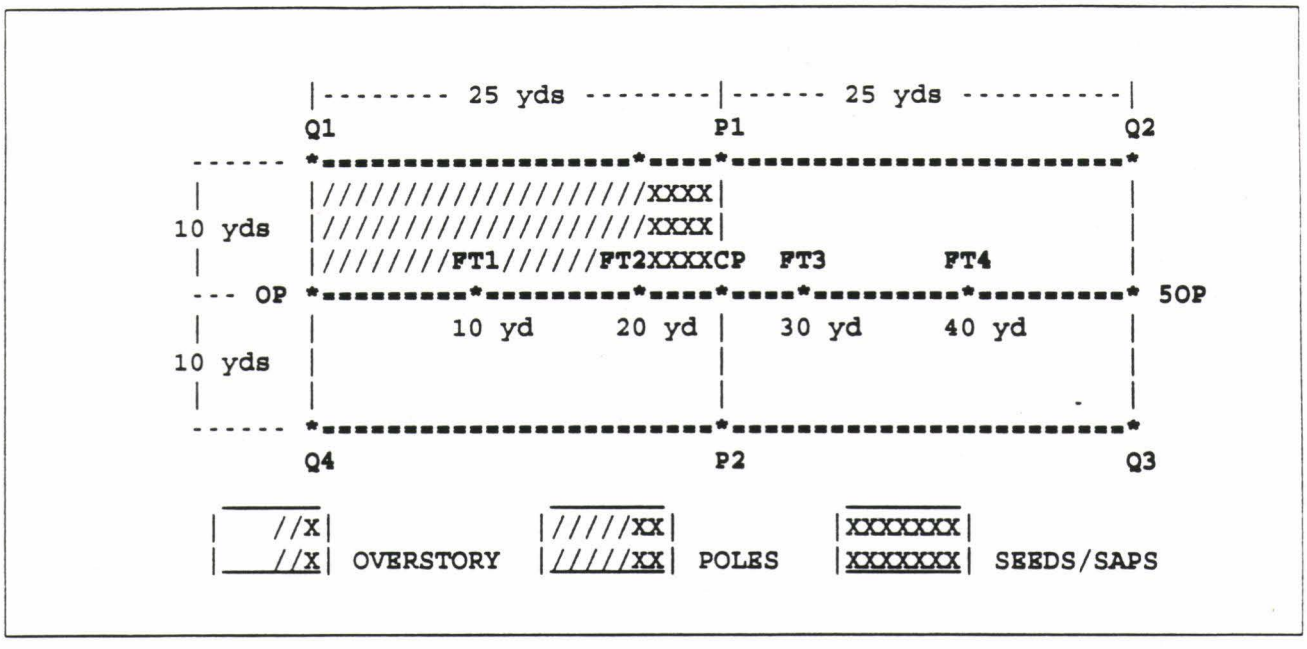
PLOT LOCATION

Select areas for locations of plots. It is desirable to establish them in areas where specific information to be monitored is available. Placement of plots prior to burning is recommended to have comparative data.

Our method is to consciously locate an area suitable for establishing a plot, then use a predetermined random bearing to establish the direction of plot layout. This is done to insure information is

obtained on all the variables desired to monitor, and to obtain complete information. In areas of more uniformity and homogeneity, random selection of plots could be employed. Specific selection could be attained using some sort of selection criteria, predetermined prior to going to the field. Once the plot is located, it is very important to carefully complete the ***Index Plot Location Data Sheets*** and ***Plot Location Map*** including good instructions on how to find the plot again, as the person(s) establishing the plot may not be the same one's returning subsequently for future measurements.

PLOT DESIGN



PLOT LAYOUT STEPS

1) Tag a reference tree along the road where you take off from, with compass bearing and distance to the plot. (Avoid using pine trees for tag trees as porcupines are attracted to them and tend to tear up the tags.)
2) Begin filling out the ***Index Plot Location Data Sheet***, and complete during plot layout.
3) Place a painted rebar stake (fluorescent spray paint on all stakes will help locate later) at the selected origin, this becomes point **OP**.
4) Select a predetermined or random bearing to work from **OP.**
5) With a hand compass, shoot the identified bearing and walk from **OP**, 25 yards with a tape (or premeasured rope may be used), shoot a back azimuth to verify. This is point **CP**. Place a painted rebar stake at point **CP**
6) On the same bearing, continue to walk from **CP**, 25 yards with a tape shoot a back azimuth to verify. This is point **50P**. Place a painted rebar stake at point 50P.
7) From points **OP, CP** and **50P** subtract 90° from the original bearing and walk 10 yards to points **Q1, P1** and **Q2** respectively. Shoot a back azimuth to verify. Place a painted rebar stake at points **Q1, P1** and **Q2.**

8) From points **OP, CP** and **50P** add 90° to original bearing and walk 10 yards to points **Q3, P2** and **Q4** respectively. Shoot a back azimuth to verify. Place a painted rebar stake at points **Q3, P2** and **Q4**.
9) Lay flagging between the pieces of rebar so the plot and quadrants are visible to those inventorying (optional).
10) Measure 5 yards from **P1** toward**Q1**, then measure 5 yards from **CP** to **OP**. This 5 yards by 10 yard area is where you do the seedling and sapling inventory.
11) Mark every 10 yards with painted rebar stakes between **OP** and **50P**. This marks the start of the fuel transects (**FT**).
12) Identify and tag an identifiable reference point close to **OP**, and record it's bearing and distance to **OP**, on the ***Index Plot Data Sheet*** and ***Plot Location Map***.
13) Revisit plots annually to freshen paint on rebar, fix flagging, and check duff washer to see if they have been disturbed.

PLOT IDENTIFICATION TAG

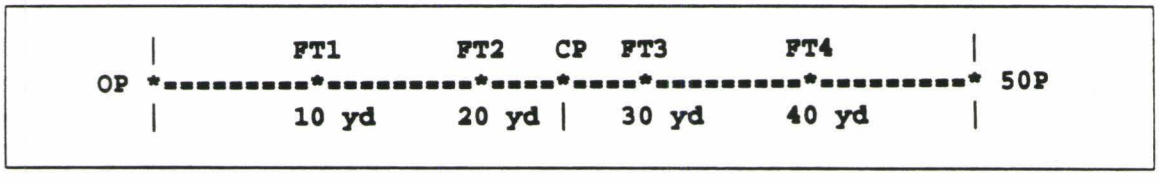
RX Fire Monitoring Plot

PROJECT NAME _____
PLOT # _____
DATE _____

INVENTORY PROCESSES

Each step has a worksheet, with header information and follows a logical process for that step, by providing the spaces to fill in information.
The following inventory sheets should be used.

A. FUEL INVENTORY AND BURN SEVERITY SAMPLING



FUEL INVENTORY

Process that we used was taken from the Handbook for Inventory Downed Woody Material by James K. Brown. (1974)

Fuel inventory and duff/litter data are recorded on the ***Fuels Inventory Data Sheet***. Fuel inventory occurs along four 50 foot fuels transects (FT) running in random directions from points along the **OP** to **50P** line at **FT1**(10 yards), **FT2**(20 yards),

FT3(30 yards and **FT4**(40 yards). From each **FT** point run the tape in a randomly selected direction for 50 feet. Place a rebar stake at the end point of the transect. It is important to minimize foot traffic along the transects and within the plot as a whole to avoid disturbing the fuel bed.

Measure and record all 3 inch and greater (to nearest 0.5") intercepts along the entire 50 foot transect and recording whether sound or rotten in proper column. Count and record all 0 to 1/4 inch intercepts from 0 to 6 feet along the transect; all 1/4 to 1 inch; and the 1 to 3 inch material from 0 to 12 feet along the transect. A "Go-No Go " gauge is helpful for all fuel inventory counts.

Measure and record the high intercept depth as the vertical distance from the bottom of the litter layer to the highest intersected dead particle for each of three, (0-1', 1-2', and 2-3') adjacent 1-foot-wide vertical partitions of each fuel transect, starting at the beginning of each fuel transect. Record to the nearest inch. Depth should be measured from only those particles included in the inventory plane. For more details, refer to Handbook for inventorying downed woody material (James Brown)

Measure the duff and litter depth (to the nearest 0.25") at each 10 foot interval along the 50 foot transect. Using a ruler, masons trowel or similar tool, cut through the litter and duff to soil getting a good cross-section measurement. Press a 16d nail, or longer if deep duff, with a washer on the shank into the ground near each measuring point until the washer comes into contact with the duff surface, replacing litter above the nail. This will aid in measurement of duff loss during the burn . Spraying washers with fluorescent orange paint will make finding them easier after plot has been burned.

For post burn inventory, re-measure the duff and litter at the point the washer was originally placed.

Total fuel and duff loading calculations can later be accomplished, in the office, on the ***Fuels Inventory Calculation Sheet***.

BURN SEVERITY

Burn severity is measured on post burn plots at 5 foot intervals along the 50 foot fuels inventory transects. A masons ruler made into a 1 foot square frame is laid on the ground, each 5 foot interval point as the center of the one square foot area. Using the burn severity code descriptions, record which code best represents the one square foot area.

Burn Severity Code Descriptions

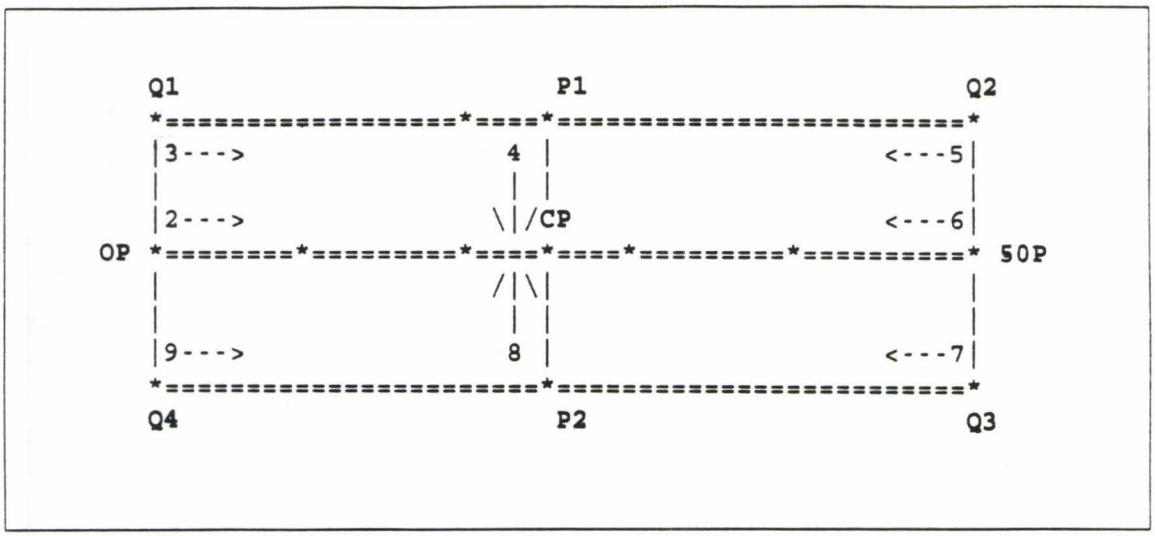
1. Heavily burned, organic layer consumed.
2. Moderately burned, organic layer partially consumed.
3. Lightly burned, plants charred but original form visible.
4. Scorched, plant parts yellow or brown but identifiable.
5. Unburned, plant parts green and unchanged.
6. No Organic Material.

Codes are also printed at the bottom of the ***Fuels Inventory Data Sheet***.

FUEL INVENTORY CALCULATION AND SUMMARY

Using the ***Fuels Inventory Calculation Sheet***, total the number of pieces by size class for the 0-3" material and calculate tons per acre, with the provided formulas. For >3" material, square each diameter, then sum by sound and rotten and calculate the tons per acre using the provided formulas on the sheet. Tons per acre of duff is calculated on the sheet using an average of 5 t/ac per inch for pine and 6 t/ac per inch for fir. Transfer all information onto the ***Fuels Inventory Summary Sheet*** and record frequencies of burn severity occurrences code, for post burn inventories.

B. PHOTOGRAPHING THE PLOT

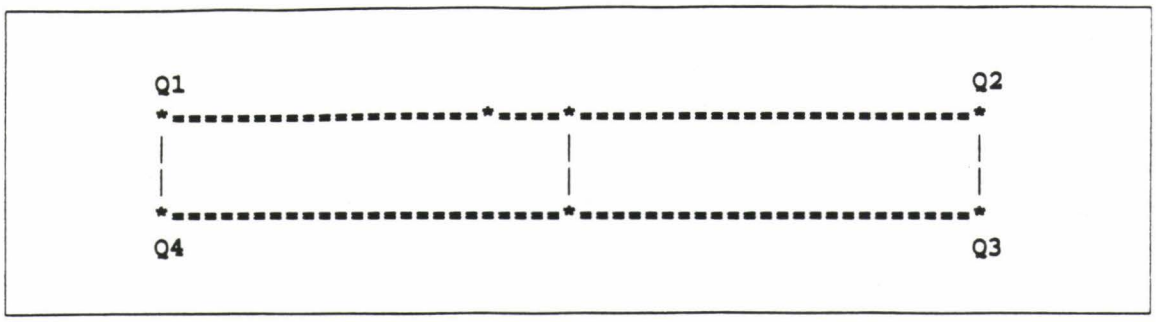


Photograph each plot along the main points around the perimeter of the plot, at points **0P, Q1, P1, Q2, 50P, Q3, P2, & Q4**. The sequence is also indicated on the ***Photographic Record Sheet***. The beginning (begin frame) and ending frames (end frame) for each plot should be taken of a piece of paper with the project name, plot name, date, and photographers name written on it.

Place a standard fuel marker (a 1 square foot, white with black fuels triangle, mounted on a pole painted in contrasting colors black/white at 1 foot intervals to provide perspective) at the point to which you are taking the photo. (For example, for the photo from **Q1** to **P1**, the marker would be placed at **P1**). Note the photo number, time, camera used, lens used, ASA, and roll ID on the ***Photographic Record Sheet***.

The photographic record during burning will be completed on the ***Fire Behavior Observation Sheet***.

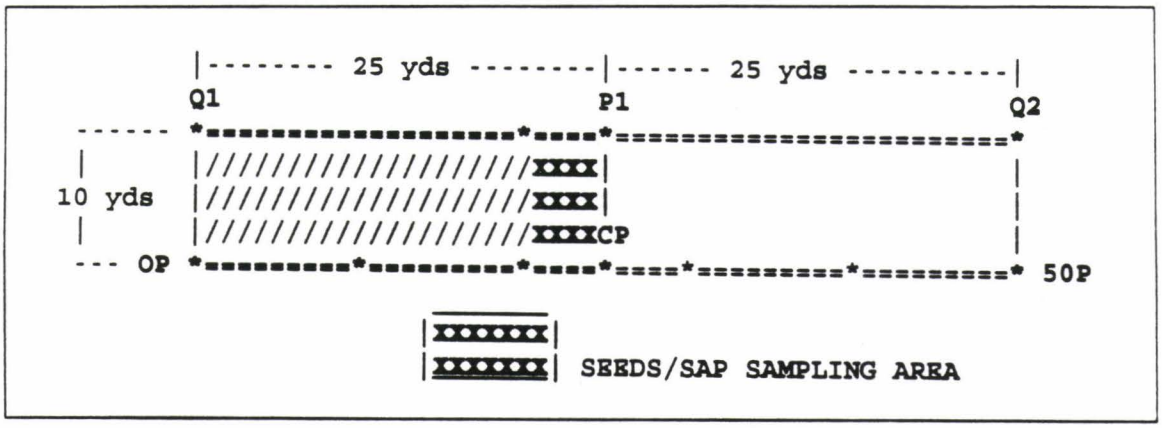
C. BRUSH INVENTORY



The focus of this inventory is to identify the key deer browse species and to monitor the plant condition and resprout success following burning.

The brush inventory is performed in a 6 foot wide transect strip from **Q1** to **Q2**, and from **Q3** to **Q4**. This can be accomplished by using the mason's ruler unfolded to a length of 6 feet. Start at the beginning **Q1** point, holding the ruler horizontally, with one end directly above the plot boundary, and the other pointing toward the inside of the plot. Count all intercepts of desired brush species, where at least half of the root crown is within the 6 foot strip. Record the intercept number, the species, and plant condition. Determination of plant condition is somewhat subjective based on appearance (good, fair, poor, & dead). For post burn inventories, record whether the particular plant burned or not, and whether re-sprouting has occurred. All information is entered on the ***Transect Brush Density Data Sheet***.

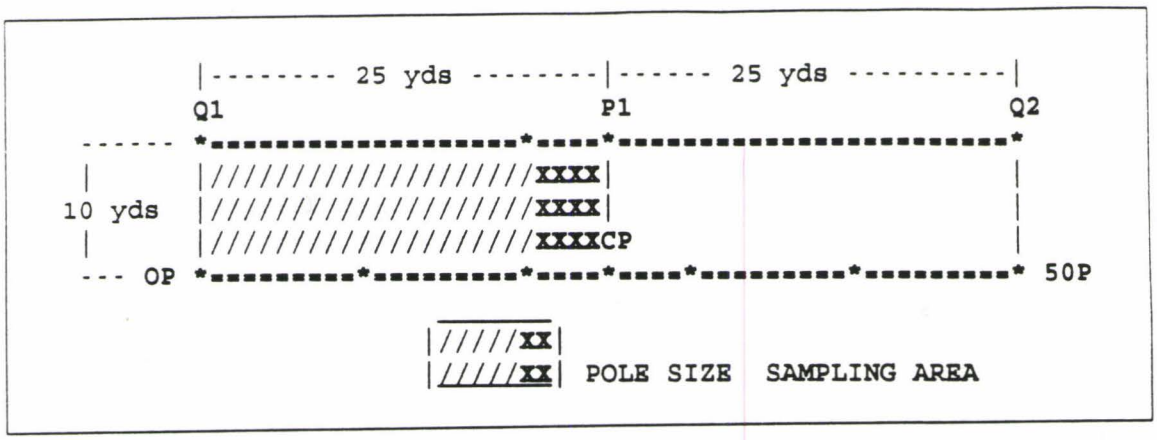
D. SEEDLING AND SAPLING INVENTORY



Seedling and Sapling (trees less than 5.9 inches DBH) inventory is performed in a 5 by 10 yard portion of the **Q1** quadrant (**Q1** to **P1**, **P1** to **CP**, **CP** to **OP**, as indicated on plot diagram). Count all trees within this plot and record species using commonly associated codes (PP, IC, WF, DF), a sequential number and whether or not the tree is alive, on the ***Seedling and Sapling Data Sheet***.

Helpful Hint - If the plot is extremely dense and uniform, count only 1/4 of the plot (2 1/2 by 5 yards) and indicate on the data form that the area was sampled in quarter.

E. POLE SIZE TREE INVENTORY

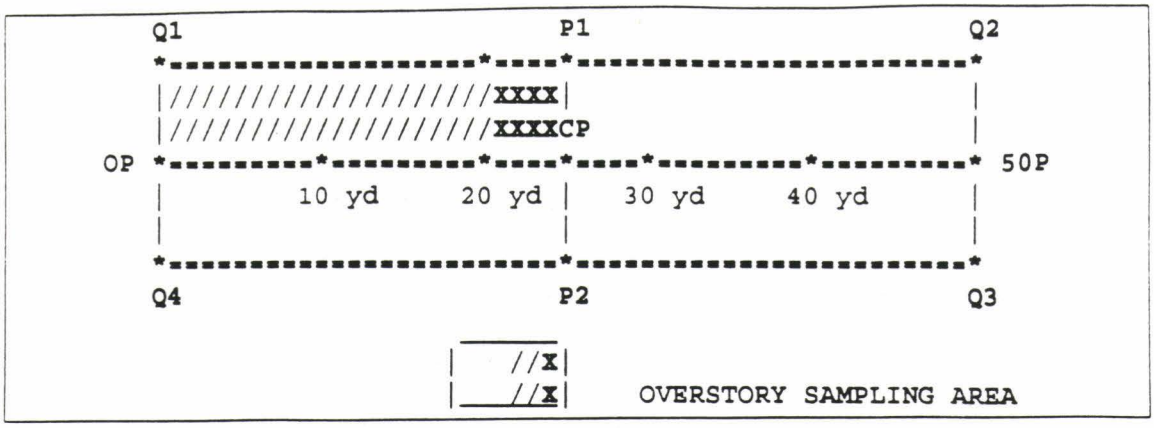


Pole size trees (6 to 19.9 inches DBH) are counted and tagged in all of quadrant **Q1**, (**Q1** to **P1**, **P1** to **CP**, **CP** to **OP**). As with the seedlings and saplings, they may be inventoried in quarter if dense and uniform. Each tree is tagged with a sequentially numbered aluminum tag facing OP. Record the tag number, species, DBH, live or dead, percent of total height that is crown, total height, and any damage or disease that is observed, using established codes (may use more than one). Record observations on the ***Pole Size Tree Data Sheet***.

DAMAGE & DISEASE CODES

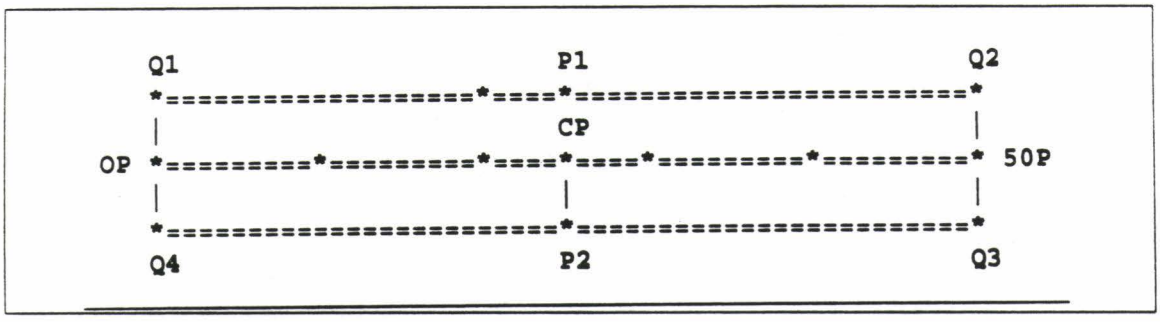
ABGR - Abnormal growth pattern
BIRD - Bird; (woodpecker holes)
BLIG - Blight
BROM - Witches broom
BURL - Burl
CONC - Conc; Large shelf fungus
CROK - Crooked or twisted bole
FIRE - Firescar or cambium damage
FORK - Forked top
INSE - Insects or their signs
LEAN - Tree is leaning
LIGT - Lightning scar
MAMM - Mammal-caused damage
MISL - Mistletoe present
ROOT - Large roots exposed
ROTT - Rot, fungus other than conc
SPAR - Unusually sparse foliage
TWIN - Twinned tree–below DBH
WOND - Wound–Cracks, etc.
SPIK - Spiked top

F. OVERSTORY TREE INVENTORY



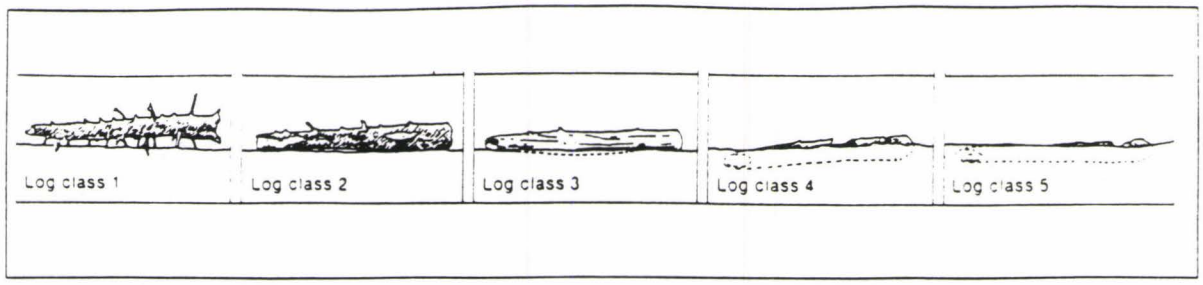
The overstory tree (20 inches DBH and over) inventory is done in the same way the pole size tree inventory is done, except that it is done for the entire plot. Each tree is tagged with a sequentially numbered aluminum tag facing OP. Do not use plastic tags as they fade and will melt if heat or flames make contact. Record the tag number, species, DBH, live or dead, percent of total height that is crown, total height, and any observed damage or disease using the same codes as in the pole size tree inventory. Record the observed information on the ***Overstory Tagged Tree Data Sheet***.

G. DOWNED LOG INVENTORY

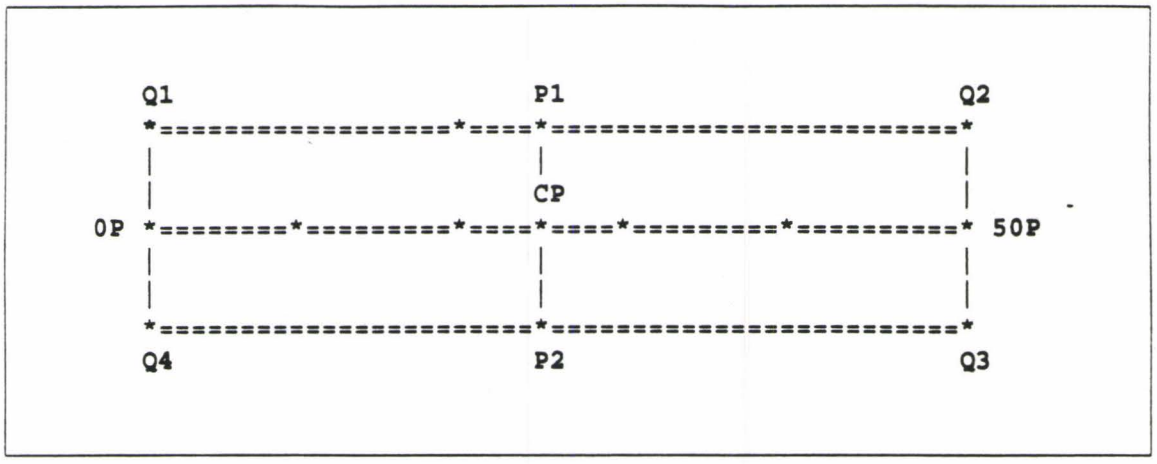


All downed logs with a diameter greater than 20 inches at the small end are inventoried within the entire plot. Any log that lies at least 50% within the plot boundaries should be counted, others should not. For decomposed logs, estimate the original sound diameter. Sketch and record the length, measured small end diameter, measured large end diameter, what quadrates log lays in and log class (see illustration) on the ***Large Downed Log Data Sheet***. For post burn inventories, estimate the percentage of the log that was consumed in the burn and record.

Log Classification Illustration

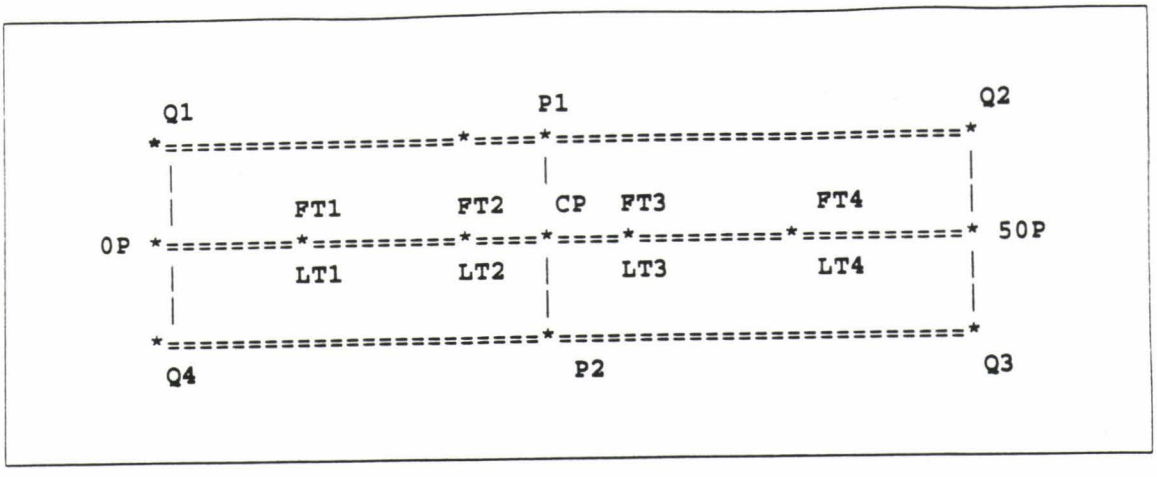


H. FIRE BEHAVIOR OBSERVATIONS



Using the ***Fire Behavior Observation Sheet***, record information as the fire passes through the plot. Information should include, but not be limited to weather (on site & RAWS, if available), firing method, rates of spread (forward & backing), flame lengths and heights, general observations or comments. Photographs are also encouraged, with reference to the point it is taken from and looking towards. Unlike the photographing of the plot, this can be in any direction desired as the points are only for reference.

I. LITTER TRAP INVENTORY



Litter Traps - Place a one square foot litter trap (LT) at the start of each fuel transect, starting at transect (FT1).

Collect litter from each trap and put into separate containers or bags with the following information; plot # & name, date, litter trap number and who collected it. Collect traps prior to burning of area. Place back when burning has been completed. Dry litter in fuels oven for 24 hours. Weigh dried fuels. Use calculations on ***Litter Trap Sheet*** to get your tons/acre. Litter traps are one foot squares, constructed out of 2"x2" pieces of wood and 1/4" hardware cloth for the bottom. Be consistent with the amount of time the traps are left out during pre and post burn phases.

APPENDICES

I - Tools and Materials
II - Abbreviated Version for Setting up Plots and Order of Inventory
III - Examples of completed Field inventory and Data Sheets
IV - Field Inventory and Data Sheets

REFERENCES

1990, Western Region Fire Monitoring Handbook. Prescribed and Natural Fire Monitoring Task Force.

1974, Brown, James. Handbook for Inventorying Downed Woody Material, USDA FS, General Technical Report INT-16.

APPENDIX I

TOOLS AND MATERIALS FOR INVENTORY

INVENTORY TOOLS

35MM CAMERA
2 HAND HELD COMPASSES (360° azimuth)
100' LOGGERS TAPE
CLINOMETER (slope & tree height)
MASONS RULER
MASONS TROWEL
GO/NO GO FUEL GAUGE
FUEL STANDARD POST (for photo interpretation assistance)
HAND COUNTER (tally register)
CRUISERS WRIST DICE
DIAMETER TAPE
RANDOM NUMBER CHART
DAY GLO FLUORESCENT ORANGE SPRAY PAINT
MAPS AND AERIAL PHOTOS
CLIP BOARD
PENS AND PENCILS
FELT TIP MARKERS
HAMMER

MATERIALS FOR EACH PLOT

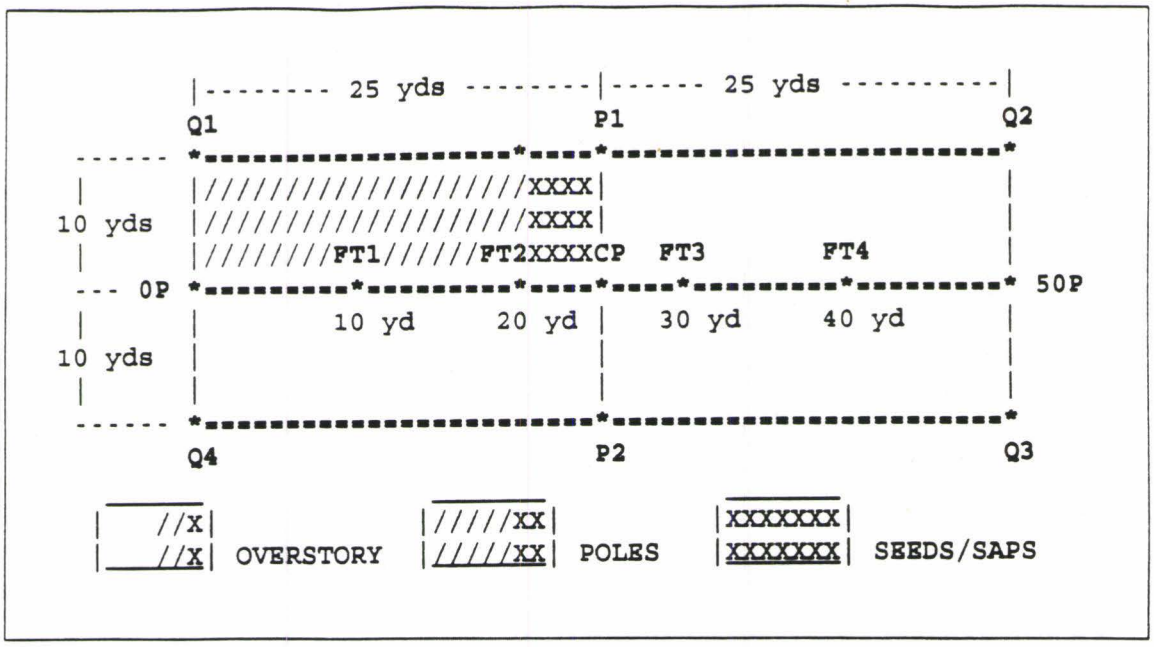
35- MM FILM (1 ROLL
2- SQUARE ALUMINUM TAGS - FOR PLOT & REFERENCE MARKERS ALONG ROAD
30- ALUMINUM TAGS - FOR KEY POINTS AND POLE/OVERSTORY TREES
24- ALUMINUM NAILS - FOR TAGGING TREES
17- 18" LONG REBAR STAKES - FOR MARKING KEY POINTS, 4 TO MARK THE END OF FUEL TRANSECTS
4- ROLLS OF FLAGGING
20- NAILS (16d) W/WASHERS- FOR MEASURING DUFF CONSUMPTION
4- LITTER TRAPS
2"x2" PIECES OF WOOD
1/4" HARDWARE CLOTH

OPTIONAL

PRE-MEASURED ROPES
1 @ 50 YARDS WITH RINGS AT EACH END AND IN THE CENTER & MARKED EVERY 10 YARDS.
1 @ 10 YARDS WITH RINGS ON EACH END
STAINLESS STEEL WIRE - TO MEASURE FUEL DIAMETER REDUCTION
LINESMAN PLIERS
13 WOODEN SURVEY STAKES (for better visualization of points)

APPENDIX II

ABBREVIATED VERSION FOR SETTING UP PLOTS AND ORDER OF INVENTORY



1) Tag a reference tree along the road where you take off from, with compass degrees and distance to plot.
2) Place a painted rebar stake at the selected origin, this becomes point **0P**.
3) Select a predetermined or random azimuth to work from **0P.**
4) With a hand compass, shoot the azimuth and walk from **0P**, 25 yards with a tape (or premeasured rope), shoot a back azimuth to verify. This is point **CP**.
5) Place a painted rebar stake at point **CP**.
6) Shoot the azimuth and walk from **CP**, 25 yards with a tape or pre-measured rope, shooting a back azimuth to verify. This is point **50P**.
7) Place a painted rebar stake at point **50P**.
8) PERFORM FUEL INVENTORY AND BURN INTENSITY SAMPLING
   a. Establish fuel inventory transect points along this line at FT1(10 yards), FT2(20 yards), FT3(30 yards), and FT4(40 yards) from **OP**.
   b. Select random bearing directions for each of the four line transects, using a watch, dice, or random number tables.
   c. These transects are 50' long and are staked with a rebar post at the start, and rebar post at the end of the 50' transect.
   d. Perform and record the fuel inventory and burn intensity sampling, as described in the Fuel Inventory and Burn Sampling Section.
9) From points **OP, CP** and **50P** subtract 90° from the original azimuth and walk 10 yards to points **Q1, P1** and **Q2** respectively.
10) Place rebar stakes for points **Q1,P1** and **Q2**.
11) From points **OP, CP** and **50P** add 90° to original bearing and walk 10 yards to points **Q4, P2** and **Q3** respectively.
12) Place rebar stakes at points **Q3, P2** and **Q4.**
13) Lay flagging between the pieces of rebar so the plot and quadrants are visible to those Inventorying (optional).

14) PHOTOGRAPH THE PLOT
   a. Perform and record the photo sampling as described in the Photographing section.
15) PERFORM BRUSH INVENTORY
   a. Perform and record the brush sampling as described in the Brush Inventory sections.
16) Locate a point 20 yards from **Q1**, towards **P1** and mark it with a rebar stake. This in combination with the starting point of fuel inventory plot number 2, create the 5 yard by 10 yard sampling area for seedling and saplings.
17) PERFORM SEEDLING AND SAPLING INVENTORY (Trees 0" - 5.9")
   a. Perform and record the seedling and sapling sampling as described in the Seedling and Sapling Inventory section.
18) PERFORM POLE SIZE TREE INVENTORY (Trees 6" - 19.9")
   a. Perform and record the pole size tree sampling as described in the Pole Size Tree Inventory section.
19) PERFORM OVERSTORY TREE INVENTORY (Trees >20")
   a. Perform and record the overstory tree sampling as described in the Overstory Tree Inventory section.
20) PERFORM DOWNED LOG INVENTORY
   a. Perform and record the downed log sampling as described in the Downed Log Inventory section.
21) Identify and tag an identifiable reference point close to **OP**, and record it's location and distance from road points, on the Plot Location Map and Index Plot Data Form.
22) PERFORM LITTER TRAP INVENTORY
   a. Perform and record the litter trap sampling as described in the Litter Trap Inventory section.

APPENDIX III

EXAMPLES OF COMPLETED INVENTORY AND DATA SHEETS

A. *Index Plot Location Data Sheet*

B. *Plot Location Map*

C. *Photographic Record Sheet*

D. *Transect Brush Density Data Sheet*

E. *Fuels Inventory Data Sheet*

F. *Fuels Inventory Calculation Sheet*

G. *Fuels Inventory Summary Sheet*

H. *Seedling and Sapling Data Sheet*

I. *Pole Size Tag Tree Data Sheet*

J. *Overstory Tag Tree Data Sheet*

K. *Large Downed Log Data Sheet*

L. *Fire Behavior Observation Sheet*

M. *Litter Trap Data Sheet*

INDEX PLOT LOCATION DATA SHEET

PLOT ID Blakeless 2 DATE 8/20/91

RECORDERS Jim, Jerry, Mike, Megan TOPO QUAD Grizzly Valley

LAT 120° 36' LONG 39° 57' SECTION 14 TOWNSHIP 24N RANGE 12E

SLOPE % 11% ELEVATION 6240 ASPECT SW

DATE OF LAST KNOWN FIRE Lightning fires < 1 acre in 1980's

FIRE HISTORY OF THE PLOT 1930's

ROAD AND TRAIL USED TO TRAVEL TO THE PLOT F.S. Road 112 F.S. Road 25N35

TRUE COMPASS BEARING FROM ROAD/TRAIL POINT TO THE PLOT:

186 DEGREES. For approximately 12 chains

DESCRIBE THE ROUTE TO THE PLOT;
Take F.S. Rd. 112 to end of pavement. Continue for another 6.0 miles to F.S. Road 25N35. Go right for 1.5 - 1.6 miles.

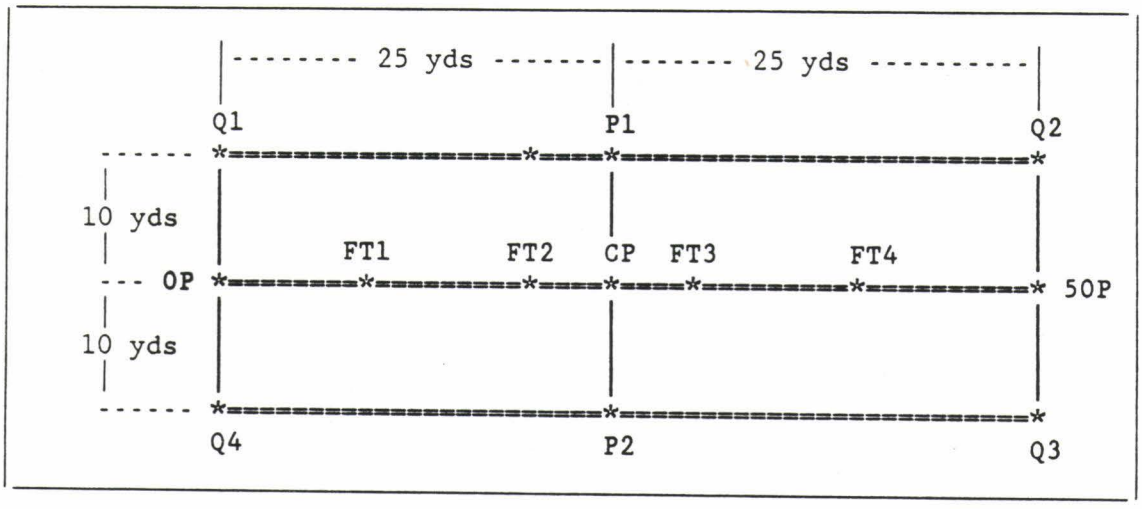
DESCRIBE THE REFERENCE FEATURE OR TAG TREE CLOSEST TO OP Mark tree to plot below Rd. 15" P Pine. 70" charred cedar, right of plot.

FOREST PLOT

BURN STATUS: PRE____ POST x (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RANDOM BEARING FOR 50 YD. LINE FROM OP TO 50P: 160°

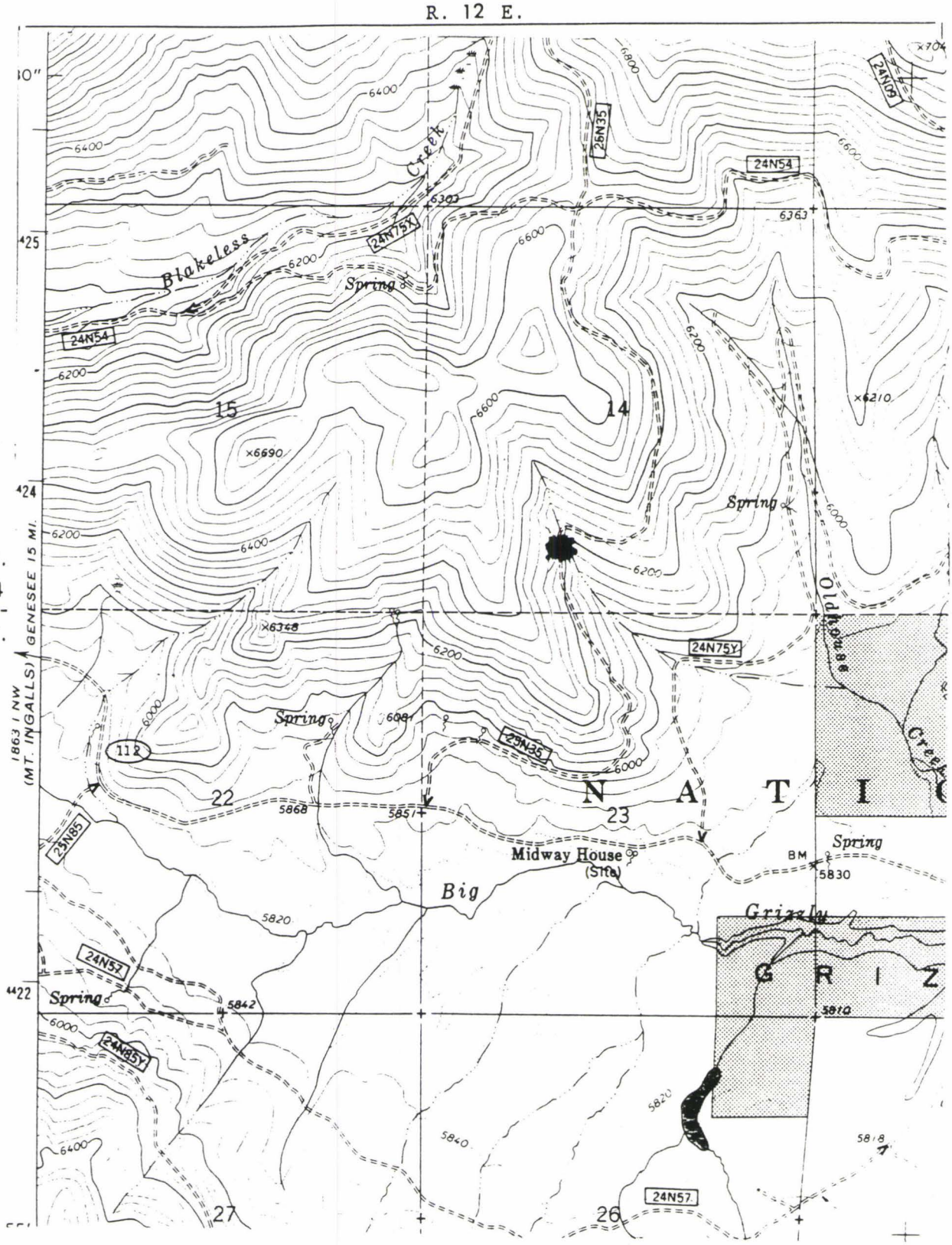
AZIMUTH READINGS: 50P TO Q2, CP TO P1/OP TO Q1 70° OP TO Q4, CP TO P2/50P TO Q3 250°



REMARKS:

PLOT LOCATION MAP

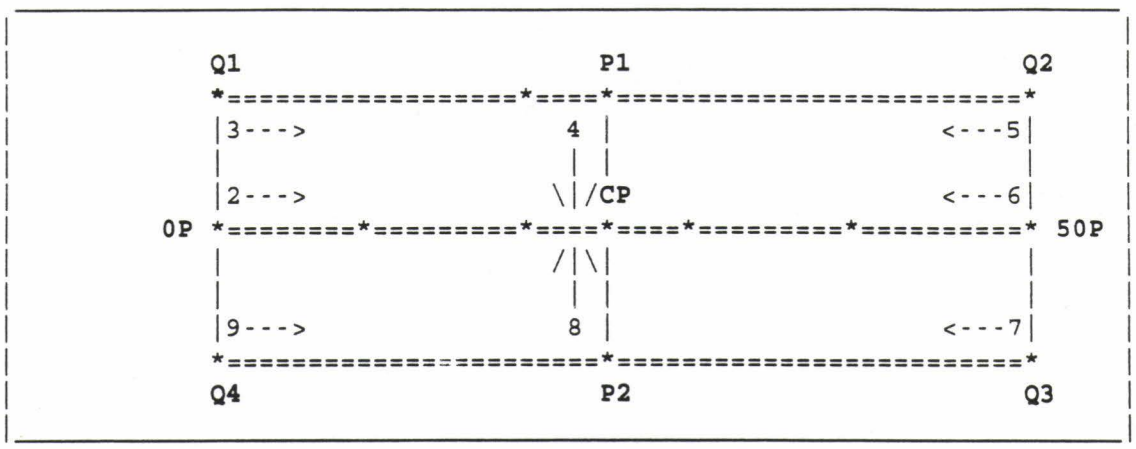
PLOT ID Blakeless #2 DATE 8/20/91 QUAD NAME Grizzly Valley



PHOTOGRAPHIC RECORD SHEET

PLOT ID Blakelee 2 DATE 8/20/91 PHOTOGRAPHER J. Hurley

BURN STATUS: PRE_____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)



PLOT PHOTOGRAPHS CAMERA USED Minolta

CAMERA LENS 50 MM FILM Kodak ASA 200 ROLL ID #1

FIELD OF VIEW

					PHOTO ID CODE
1. BEGIN FRAME *	PHOTO #	12	TIME	1505	BEGIN FRAME
2. OP TO CP: **	PHOTO #	13	TIME	1515	OP-CP
3. Q1 TO P1: **	PHOTO #	14	TIME	1515	Q1-P1
4. P1 TO CP: **	PHOTO #	15	TIME	1520	P1-CP
5. Q2 TO P1: **	PHOTO #	16	TIME	1523	Q2-P1
6. 50P TO CP: **	PHOTO #	17	TIME	1525	50P-CP
7. Q3 TO P2: **	PHOTO #	18	TIME	1526	Q3-P2
8. P2 TO CP: **	PHOTO #	19	TIME	1523	P2-CP
9. Q4 TO P2: **	PHOTO #	20	TIME	1530	Q4-P2
10.	PHOTO #	21	TIME	1531	Brush Survey
11.	PHOTO #	22	TIME	1535	Brush Survey
12.	PHOTO #		TIME		
13.	PHOTO #		TIME		
14.	PHOTO #		TIME		
15.	PHOTO #		TIME		
16.	PHOTO #		TIME		
17.	PHOTO #		TIME		
18.	PHOTO #		TIME		
19.	PHOTO #		TIME		
20. END FRAME *	PHOTO #	23	TIME	1542	END FRAME

* BEGIN/END FRAME: WRITE ON BLANK PAPER PROJECT NAME, PLOT NAME, DATE, AND PHOTOGRAPHER

** PLACE FUEL MARKER @ SECOND POINT

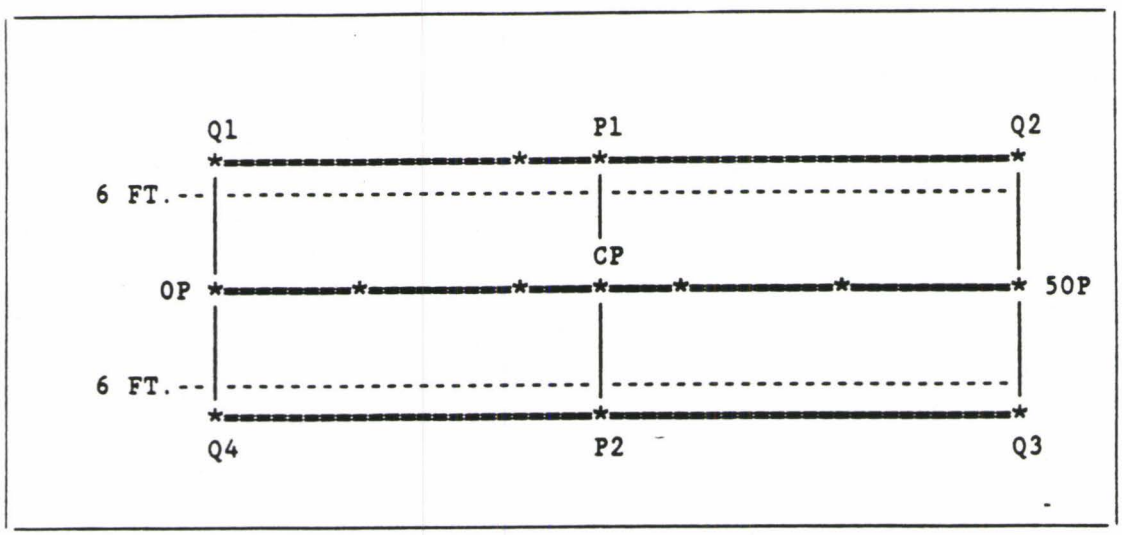
TRANSECT BRUSH DENSITY DATA SHEET

PLOT ID Blakeslee 2 DATE 8/20/91 RECORDERS Mike

BURN STATUS: PRE ____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: INTERSEPTS (INT), SPECIES BY CODE (SPP), CONDITION (COND)

FOR LIVING AND DEAD PLANTS WITHIN THE TRANSECT, COUNT ALL INDIVIDUALS HAVING ≥ 50% OF ITS ROOTED BASE WITHIN THE 6 FOOT WIDE TRANSECT.



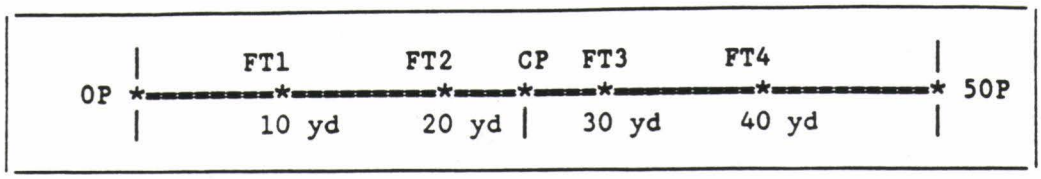
Q1 TO Q2 INTERSECTS

INT	SPP	COND *	SPROUT		BURNED OR NOT	
1	manz	Poor	(Y)	N	Y	(N)
2	manz	Poor	(Y)	N	(Y)	N
			Y	N	Y	N
			Y	N	Y	N
			Y	N	Y

FOREST INDEX PLOT FUELS INVENTORY DATA SHEET

PLOT ID Blakeley 2 DATE 8/20/91 RECORDERS Jim, Jenny, Megan

BURN STATUS: PRE____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)



TRANSECT 1

LENGTH

COMPASS DIR 242°

SLOPE 11%

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. # OF INTERCEPTS .25-1	0-12 FT. # OF INTERCEPTS 1-3
4	5	1
HIGH INTERCEPT DEPTH 0-1'	1-2'	2-3'
6"	2"	4"

0 - 50FT. * DIAMETER 3+S		3+R	
3"		0	

LITTER/DUFF ** DEPTH	L	D
10	0	0
20	1"	1"
30	1"	.5"
40	.5"	0
50	1"	0

BURN SEVERITY CODE			
5	3	30	4
10	4	35	6
15	3	40	5
20	3	45	4
25	3	50	5

LITTER TRAP: YES X NO ___

TRANSECT 2

LENGTH

COMPASS DIR 310°

SLOPE 16%

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. # OF INTERCEPTS .25-1	0-12 FT. # OF INTERCEPTS 1-3
2	2	3
HIGH INTERCEPT DEPTH 0-1'	1-2'	2-3'
2"	2"	2"

0 - 50FT. * DIAMETER 3+S		3+R	
0		0	

LITTER/DUFF ** DEPTH	L	D
10	1.5"	.25"
20	1.75"	.75"
30	1"	.50"
40	1.5"	.50"
50	1.5"	.50"

BURN SEVERITY CODE			
5	5	30	2
10	3	35	3
15	2	40	4
20	4	45	3
25	3	50	2

LITTER TRAP: YES X NO ___

TRANSECT 3

LENGTH

COMPASS DIR 38°

SLOPE 17%

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. # OF INTERCEPTS .25-1	0-12 FT. # OF INTERCEPTS 1-3
3	4	0
HIGH INTERCEPT DEPTH 0-1'	1-2'	2-3'
1"	4"	0

0 - 50FT. * DIAMETER 3+S		3+R	
4"		18"	
		35"	

LITTER/DUFF ** DEPTH	L	D
10	1.5"	1"
20	.25"	0
30	2"	2.50"
40	1.5"	1.5"
50	1.25"	.75"

BURN SEVERITY CODE			
5	4	30	3
10	4	35	4
15	3	40	3
20	2	45	3
25	3	50	3

LITTER TRAP: YES X NO ___

TRANSECT 4

LENGTH

COMPASS DIR ____

SLOPE ____

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. # OF INTERCEPTS .25-1	0-12 FT. # OF INTERCEPTS 1-3
0	1	0
HIGH INTERCEPT DEPTH 0-1'	1-2'	2-3'
0	.5	0

0 - 50FT. * DIAMETER 3+S		3+R	
3"			

LITTER/DUFF ** DEPTH	L	D
10	1"	0
20	.5"	1
30	.5"	0
40	1"	0
50	.25	0

BURN SEVERITY CODE			
5	2	30	3
10	2	35	3
15	2	40	1
20	3	45	1
25	3	50	1

LITTER TRAP: YES X NO ___

BURN SEVERITY CODE DESCRIPTIONS

1: HEAVILY BURNED, ORGANIC LAYER CONSUMED
2: MODERATELY BURNED, ORGANIC LAYER PARTIALLY CONSUMED
3: LIGHTLY BURNED, PLANTS CHARRED BUT ORIGINAL FORM VISIBLE
4: SCORCHED, PLANT PARTS YELLOW OR BROWN BUT IDENTIFIABLE
5: UNBURNED, PLANT PARTS GREEN AND UNCHANGED
6: NO ORGANIC MATERIAL
* MEASURE TO NEAREST 1/2"
** MEASURE TO NEAREST 1/4"

FUELS INVENTORY CALCULATION SHEET

PLOT ID Blakeless 2 DATE 9/10/91

BURN STATUS: PRE_____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR

SIZE CLASS	TRANSECT 1		TRANSECT 2		TRANSECT 3		TRANSECT 4		TOTALS
0 - .25	4		2		3		0		9
.25 - 1	5		2		4		1		12
1 - 3	1		3		0		0		4
3 + S	3 (9)	( )	( )	( )	4 (16)	( )	3 (9)	( )	
d^2	( )	( )	( )	( )	( )	( )	( )	( )	
	( )	( )	( )	( )	( )	( )	( )	( )	
TOTAL 3 + S	+ 9		+ 0		+ 16		+ 9		34
3 + R	( )	( )	( )	( )	A (324)	( )	( )	( )	
d^2	( )	( )	( )	( )	3.5 (12.25)	( )	( )	( )	
	( )	( )	( )	( )	( )	( )	( )	( )	
TOTAL 3 + R	+ 0		+ 0		+ 336		+ 0		336
LITTER "	3.5		7.25		6.50		3.25		20.5
DUFF "	1.5		2.50		5.75		1.00		10.75
SLOPE % *	11%		6%		17%		13%		47
							47 / 4 = avg. 10 %		

FUEL LOADING COMPUTATION SUMMARY

Contants established from Brown's Handbook for Inventorying Downed Woody Material

SIZE CLASS	CONSTANT	n	d^2	s	a	c	N1	TONS/ACRE	
0 - .25	11.64	9	.0151	.48	1.13	1.00	24	.035	I
.25 - 1	11.64	12	.289	.48	1.13	1.00	24	.912	II
1 -3	11.64	4	2.76	.40	1.13	1.00	48	1.21	III
			SUM OF d^2 FOR 3 +						
3 + S	11.64	34		.40	1.0	1.00	200	.791	IV
3 + R	11.64	336		.30	1.0	1.00	200	5.36	V
							3+ SOUND AND ROTTEN = IV + V	6.65	VI
							TOTAL = I + II + III + VI	8.90	VII

DUFF CALCULATION

TOTAL INCHES OF DUFF 10.75 /20 x 12.7 TONS/ACRE/IN. = 6.82 TONS/ACRE DUFF

DUFF LOAD FACTORS: 12.7 TONS/ACRE/IN. FOR PONDEROSA PINE 15.2 TONS/ACRE/IN. FOR WHITE FIR

EQUATIONS USED TO ARRIVE AT TONS/ACRE BY SIZE CLASS ARE:

0 - 3" DIAMETER: $\frac{11.64 \times n \times d^2 \times s \times a \times c}{N1}$ = TONS/ACRE

> 3" DIAMETER: $\frac{11.64 \times \text{sum of } d^2 \times s \times a \times c}{N1}$ = TONS/ACRE

WHERE: n_2 =NUMBER OF INTERSECTIONS
d^2 =SQUARED DIAMETERS
sum_2 of d^2 =SUM OF SQUARED DIAMETERS
s =SPECIFIC GRAVITY
a =ANGLE FACTOR
c =SLOPE CORRECTION FACTOR
N1 =LENGTH OF SAMPLING PLANE

% SLOPE	c	% SLOPE	c	% SLOPE	c	% SLOPE	c
0	1.00	30	1.04	60	1.17	90	1.35
10	1.00	40	1.08	70	1.22	100	1.41
20	1.02	50	1.12	80	1.28	110	1.49

* divide slope totals by (4) to determine avg., then round off to nearest 10th

FUELS INVENTORY SUMMARY SHEET

PLOT ID Blakeley 2 DATE 9/10/91

BURN STATUS: PRE ___ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR

FUEL LOADING BY SIZE CLASS: .035 0-.25" .912 .25-1" 1.21 1-3"

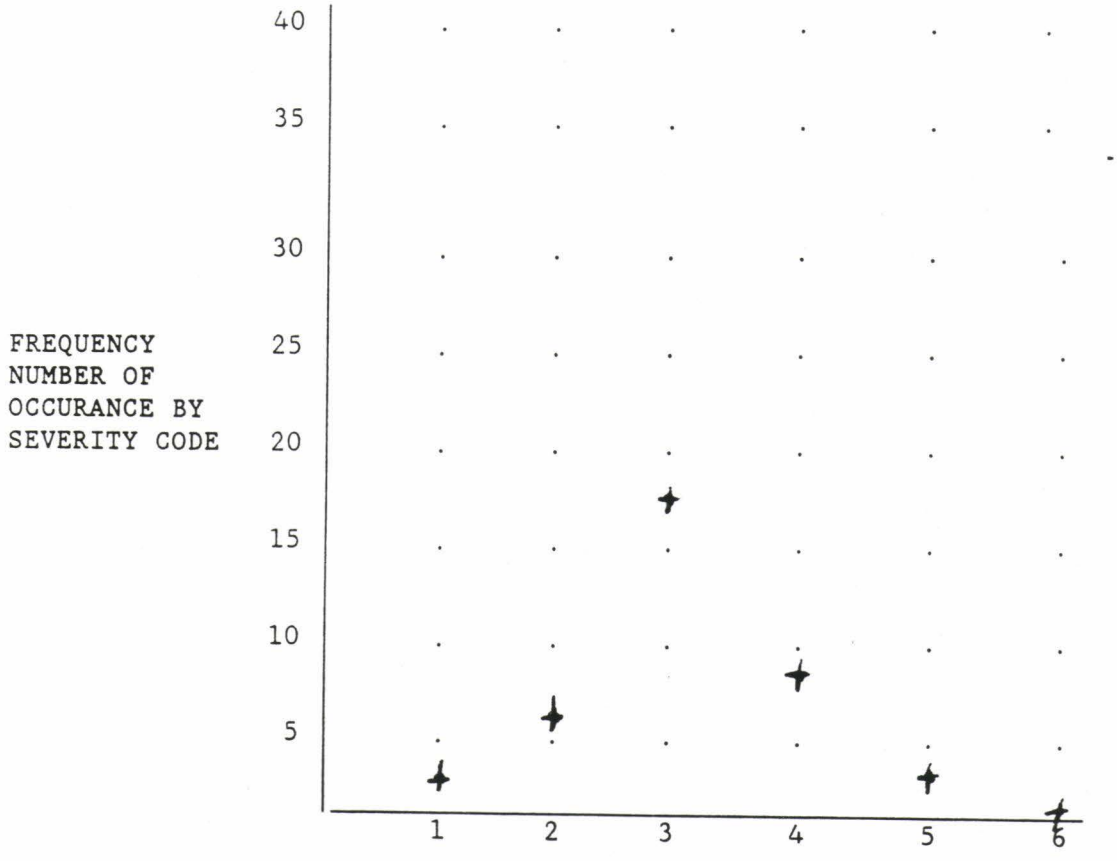
.791 3+ SOUND 5.86 3+ ROTTEN

TOTAL DEAD AND DOWN FUEL LOADING: 8.80 TONS/ACRE

6.82 TONS/ACRE DUFF

TOTAL AVAILABLE FUEL LOADING: 15.60 TONS/ACRE (DEAD AND DOWN PLUS DUFF)

BURN SEVERITY GRAPH



BURN SEVERITY CODES

1: HEAVILY BURNED, ORGANIC LAYER CONSUMED
2: MODERATELY BURNED, ORGANIC LAYER PARTIALLY CONSUMED
3: LIGHTLY BURNED, PLANTS CHARRED BUT ORIGINAL FORM VISIBLE
4: SCORCHED, PLANT PARTS YELLOW OR BROWN BUT IDENTIFIABLE
5: UNBURNED, PLANT PARTS GREEN AND UNCHANGED
6: NO ORGANIC MATERIAL

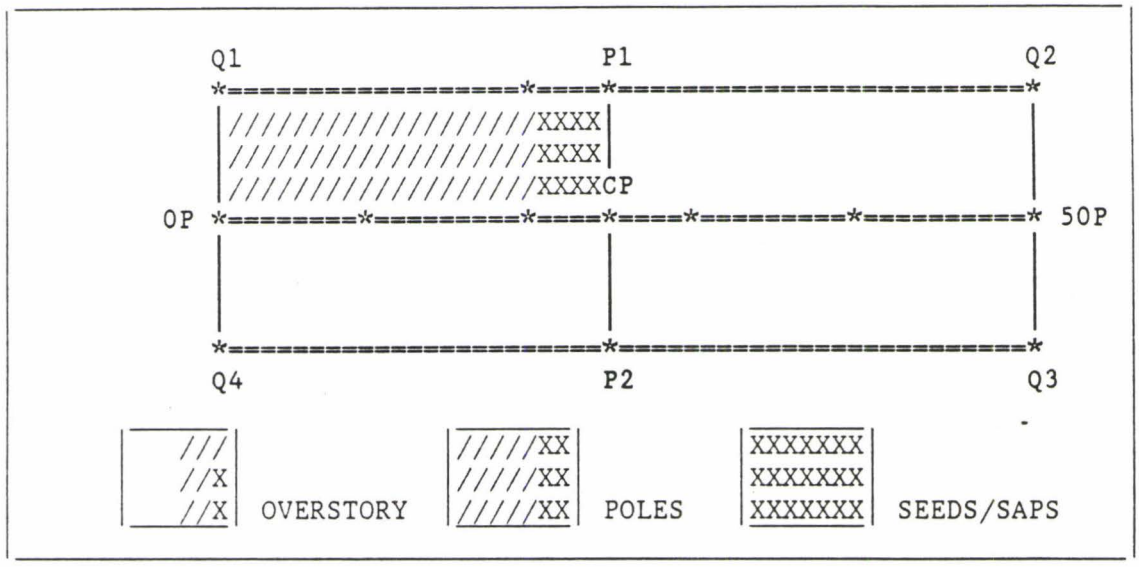
SEEDLING AND SAPLING DATA SHEET (0 TO 5.9")

PLOT ID Blakeley 2 DATE 8/20/91 RECORDERS Mike, Megan

BURN STATUS: PRE_____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: SPECIES BY CODE (SPP), ALIVE (LIVE)

DESIGNATED AREA SAMPLED IN QUARTER? (Y/N)



SPP	NUM	LIVE	SPP	NUM	LIVE	SPP	NUM	LIVE
WF	1	Y (N)			Y N			Y N
WF	2	Y (N)			Y N			Y N
WF	3	Y (N)			Y N			Y N
PP	4	Y (N)			Y N			Y N
PP	5	(Y) N			Y N			Y N
PP	6	(Y) N			Y N			Y N
PP	7	Y (N)			Y N			Y N
PP	8	Y (N)			Y N			Y N
		Y N			Y N			Y N
		Y N			Y N			Y N
		Y N

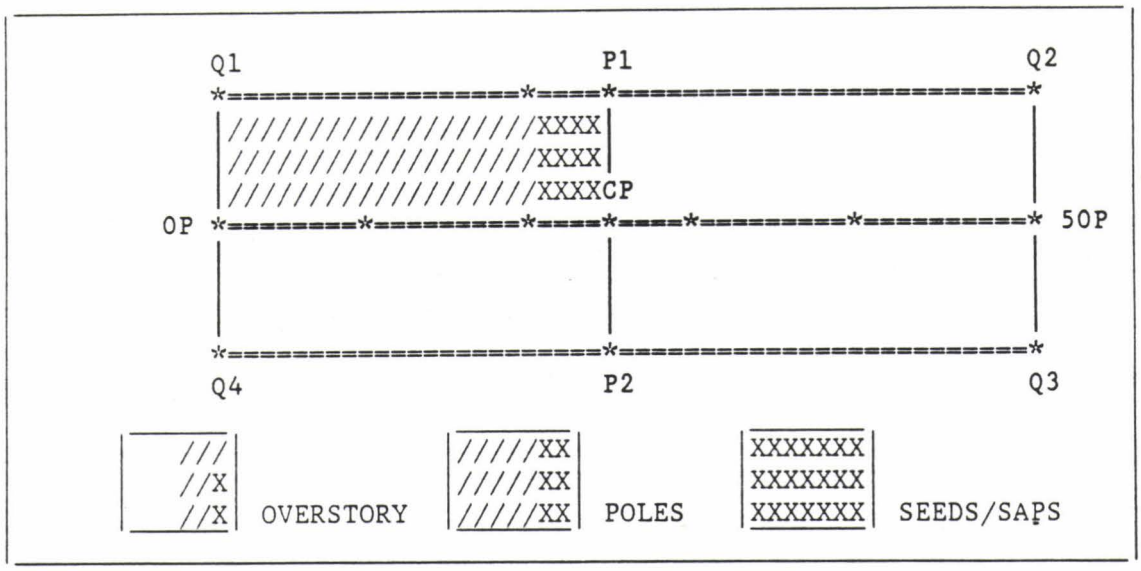
POLE-SIZE TREE DATA SHEET (6" TO 19.9")

PLOT ID Blakeley 2 DATE 8/20/91 RECORDERS Mike, Megan

BURN STATUS: PRE____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: TAG # (TAG), SPECIES BY CODE (SPP), DIAMETER (DBH), ALIVE (LIVE), CROWN (CRN), HEIGHT (HGT)

DESIGNATED AREA SAMPLED IN QUARTER? (Y/N)



TAG	SPP	DBH	LIVE	% CRN	HGT	DAMAGE CODE	COMMENTS
1	BP	9	(Y) N	50	41		
2	BP	7.5	(Y) N	40	40		
3	CEDAR	13.5	(Y) N	10	55		
4	BP	16	(Y) N	40	95		
5	WF	7	Y (N)		42	TWIN	
6	S Pine	7	(Y) N	20	35	Twin/Fork/Broom	
7	S.Pine	19	(Y) N	70	95		
8	BP	11	(Y) N	60	55		
9	BP	7	(Y) N	60	50		
10	S.Pine	8	(Y) N	20	30	Lean/Twin	
11	S.Pine	7	(Y) N	25	30		
12	WF	10	(Y) N	60	60	Twin/Mech Defect	
13	WF	9	(Y) N	90	50	Twin	
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				

ABGR	ABNORMAL GROWTH PATTERN	LEAN	TREE IS LEANING
BIRD	BIRD; (WOODPECKER HOLES)	LIGT	LIGHTNING SCAR
BLIG	BLIGHT	MAMM	MAMMAL-CAUSED DAMAGE
BROM	WITCHES BROOM	MISL	MISTLETOE PRESENT
BURL	BURL	ROOT	LARGE ROOTS EXPOSED
CONC	CONC; LARGE SHELF FUNGUS	ROTT	ROT, FUNGUS OTHER THAN CONC
CROK	CROOKED OR TWISTED BOLE	SPAR	UNUSUALLY SPARSE FOLIAGE
FIRE	FIRESCAR OR CAMBIAL DAMAGE	TWIN	TWINNED TREE--BELOW DBH
FORK	FORKED TOP	WOND	WOUND--CRACKS, ETC.
INSE	INSECTS OR THEIR SIGN	SPIK	SPIKED TOP

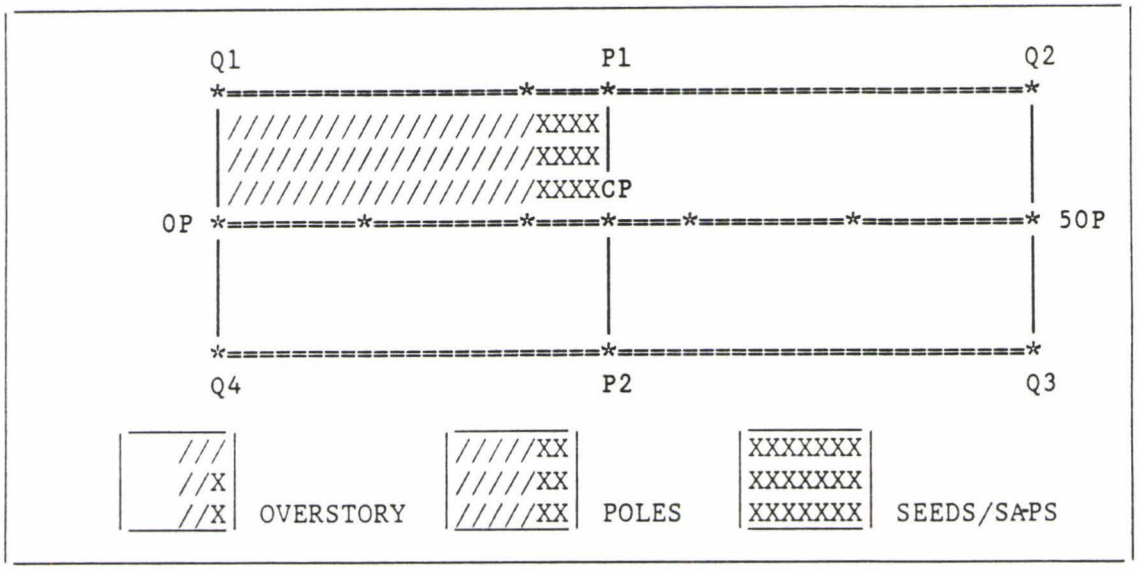
OVERSTORY TAGGED TREE DATA SHEET (> 20")

PLOT ID: Lakeland 2 DATE 8/20/91 RECORDERS Megan, Mike

BURN STATUS: PRE ____ POST x (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: TAG # (TAG), SPECIES BY CODE (SPP), DIAMETER (DBH), ALIVE (LIVE), CROWN (CRN), HEIGHT (HGT)

DESIGNATED AREA SAMPLED IN ENTIRE PLOT? (Y) N)



TAG	SPP	DBH	LIVE	% CRN	HGT	DAMAGE CODE	COMMENTS
001	SP	21	(Y) N	40	110		Locations G-1
002	PP	26	(Y) N	45	120		Locations G-3
003	PP	22	(Y) N	35	95		Locations G-4
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				

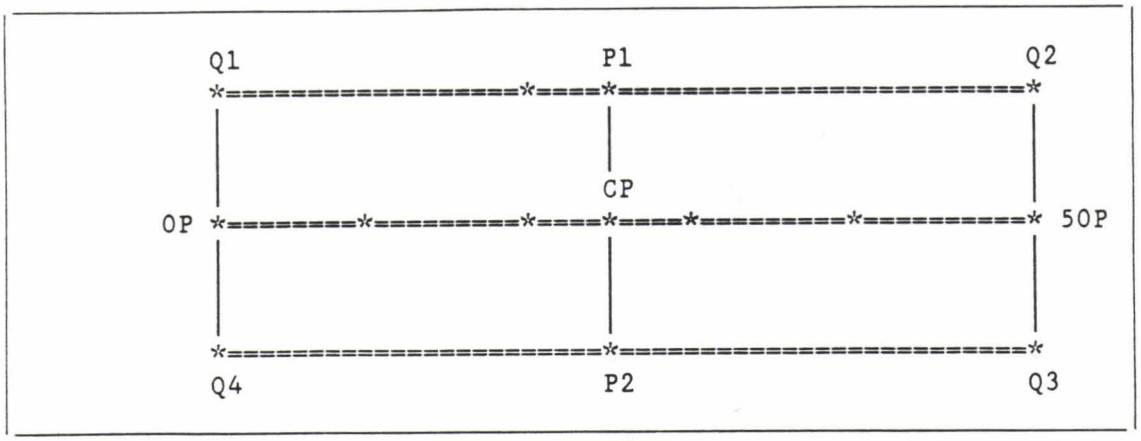
ABGR	ABNORMAL GROWTH PATTERN	LEAN	TREE IS LEANING
BIRD	BIRD; (WOODPECKER HOLES)	LIGT	LIGHTNING SCAR
BLIG	BLIGHT	MAMM	MAMMAL-CAUSED DAMAGE
BROM	WITCHES BROOM	MISL	MISTLETOE PRESENT
BURL	BURL	ROOT	LARGE ROOTS EXPOSED
CONC	CONC; LARGE SHELF FUNGUS	ROTT	ROT, FUNGUS OTHER THAN CONC
CROK	CROOKED OR TWISTED BOLE	SPAR	UNUSUALLY SPARSE FOLIAGE
FIRE	FIRESCAR OR CAMBIAL DAMAGE	TWIN	TWINNED TREE--BELOW DBH
FORK	FORKED TOP	WOND	WOUND--CRACKS, ETC.
INSE	INSECTS OR THEIR SIGN	SPIK	SPIKED TOP

LARGE DOWNED LOG DATA SHEET (> 20")

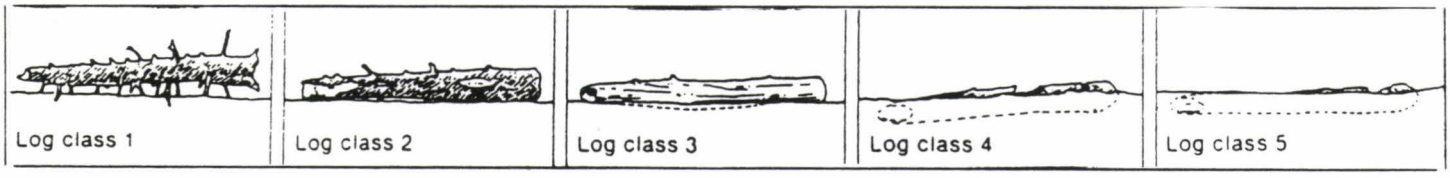
PLOT ID Blakeley 2 DATE 8/20/91 RECORDERS Mike, Megan

BURN STATUS: PRE____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

FOR ALL DOWNED LOGS GREATER THAN 20 INCHES AT THE SMALL END WITHIN THE PLOT



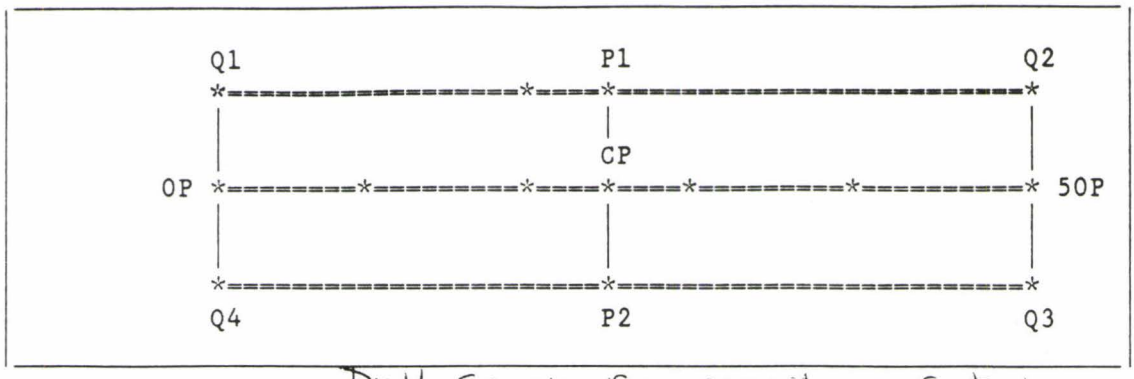
ESTIMATED DIAMETER @ LARGE END	ESTIMATED DIAMETER @ SMALL END	LENGTH	CLASS	POST BURN ESTIMATED % CONSUMED
12"	9"	19'	4	



FIRE BEHAVIOR OBSERVATION SHEET

PLOT ID Blakeley 2 DATE 10/27/92 OBSERVERS D Nelson

SLOPE 40% ASPECT North LIVE FUEL MOISTURE ____



Duff Sample Fire moisture content

WX & FIRE BEHAVIOR

TIME FIRE ENTERED PLOT 1500 TIME FIRE ENDED SPREAD IN PLOT 1525
MAXIMUM SPREAD DISTANCE THROUGH THE PLOT _____

WX @ SITE SHADE____ DB____ WB____ RH____ 1HR FM____ 10HR FM____ MFWS____ MFWD____

WX @ RAWS DB 63 RH 39 1HR FM ____ 10HR FM 8 WS(20'/MF) 5 WD 238°

FIRING METHOD HEAD ____ BACKING ___ STRIP/HEAD ____ STRIP WIDTH _____
Jackpot ignition
FLAME LENGTHS - AVERAGE 3 FT. MAXIMUM OBSERVED 4 FT.

FLAME HEIGHTS - AVERAGE 2 FT. MAXIMUM OBSERVED 5 FT.

OBSERVATIONS/COMMENTS

Shelterwood Plot. Fuel was ~~not~~ continuous throughout the plot, had to jackpot ignite existing fuels.
Quite a few 2-4 inch natural regeneration could be-exist where logging equipment has worked.

PLOT PHOTOGRAPHS

PHOTOGRAPHER D. Nelson CAMERA USED Minolta

CAMERA LENS 50 MM FILM Ektrachome ASA 200 ROLL ID _____

FIELD OF VIEW

PHOTO ID CODE

1. BEGIN FRAME *	PHOTO # 1	TIME 1445	BEGIN FRAME ON PIECE OF PAPER		
2.	PHOTO # 2	TIME 1501	AT POINT Q4	TOWARDS POINT	Q3
3.	PHOTO # 3	TIME 1503	AT POINT Q1	TOWARDS POINT	Q2
4.	PHOTO # 4	TIME 1505	AT POINT P1	TOWARDS POINT	P2
5.	PHOTO # 5	TIME 1507	AT POINT Q2	TOWARDS POINT	Q1
6.	PHOTO # 6	TIME 1509	AT POINT 50P	TOWARDS POINT	CP
7.	PHOTO # 7	TIME 1510	AT POINT Q3	TOWARDS POINT	Q4
8.	PHOTO # 8	TIME 1513	AT POINT 0P	TOWARDS POINT	50P
9.	PHOTO #	TIME	AT POINT ___	TOWARDS POINT	___
10. END FRAME *	PHOTO # 9	TIME 1521	END FRAME ON PIECE OF PAPER		

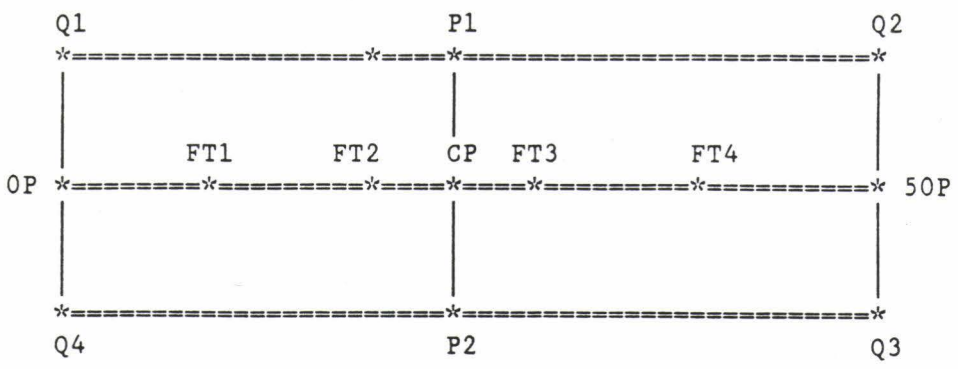
* BEGIN/END FRAME: WRITE ON PAPER PROJECT NAME, PLOT NAME, DATE, AND PHOTOGRAPHER

LITTER TRAP DATA SHEET

PLOT ID Blakeless 2 DATE 3/21/92 RECORDERS Jerry

BURN STATUS: PRE ____ POST X (1YR) 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

TOTAL T/AC 1 Time Trap was on site 6 months



LITTER TRAP #	DATE LITTER TRAP PLACED	DATE LITTER TAKEN FROM TRAP	OVEN DRY WEIGHT GRAMS (g)
FT 1	9-20-91	3-15-92	15
FT 2	9-20-91	3-15-92	36
FT 3	9-20-91	3-15-92	10
FT 4	9-20-91	3-15-92	5
		TOTAL	66 / 4 = 17 g/ft^2 (AVG)

EQUATIONS USED TO CALCULATE TONS/ACRE

g/ft^2 * 43560 = g/ac * .00225 = #/ac * .0005 = t/ac

1) g/ft^2 to acres multiply by 43560
2) grams to pounds .00225
3) pounds to ton/acre multiply by .0005

APPENDIX IV

FIELD INVENTORY AND DATA SHEETS

A. *Index Plot Location Data Sheet*

B. *Plot Location Map*

C. *Photographic Record Sheet*

D. *Transect Brush Density Data Sheet*

E. *Fuels Inventory Data Sheet*

F. *Fuels Inventory Calculation Sheet*

G. *Fuels Inventory Summary Sheet*

H. *Seedling and Sapling Data Sheet*

I. *Pole Size Tag Tree Data Sheet*

J. *Overstory Tag Tree Data Sheet*

K. *Large Downed Log Data Sheet*

L. *Fire Behavior Observation Sheet*

M. *Litter Trap Data Sheet*

INDEX PLOT LOCATION DATA SHEET

PLOT ID_____ DATE_____

RECORDERS_____ TOPO QUAD_____

LAT_____ LONG_____ SECTION_____ TOWNSHIP_____ RANGE_____

SLOPE %_____ ELEVATION_____ ASPECT_____

DATE OF LAST KNOWN FIRE_____

FIRE HISTORY OF THE PLOT_____

_____

ROAD AND TRAIL USED TO TRAVEL TO THE PLOT_____

_____

TRUE COMPASS BEARING FROM ROAD/TRAIL POINT TO THE PLOT:

_____ DEGREES.

DESCRIBE THE ROUTE TO THE PLOT;

DESCRIBE THE REFERENCE FEATURE OR TAG TREE CLOSEST TO OP_____

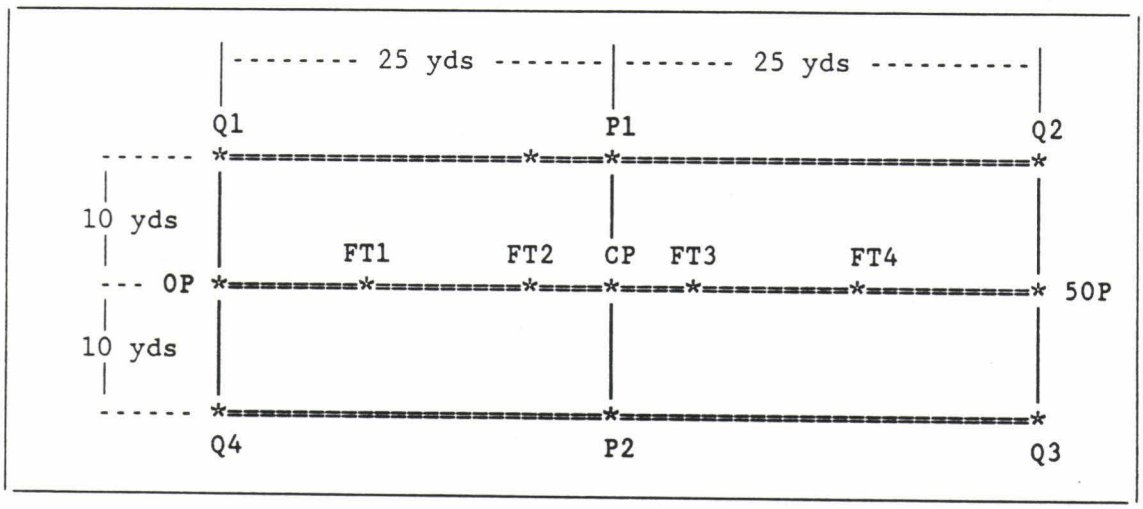
_____

FOREST PLOT

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RANDOM BEARING FOR 50 YD. LINE FROM OP TO 50P: _____

AZIMUTH READINGS:50P TO Q2, CP TO P1/OP TO Q1_____ OP TO Q4, CP TO P2/50P TO Q3 _____



REMARKS:

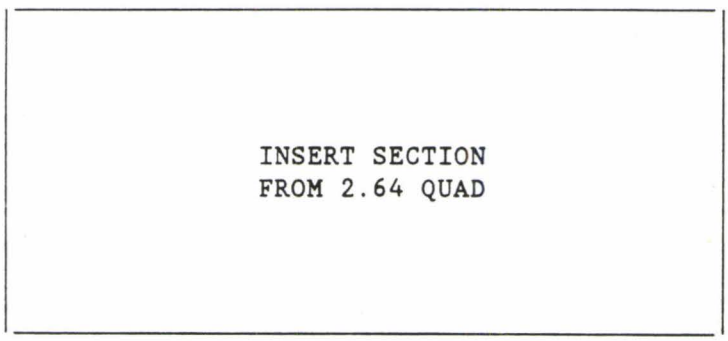
PLOT LOCATION MAP

PLOT ID_____ DATE_____ QUAD NAME_____

R. E.

T.

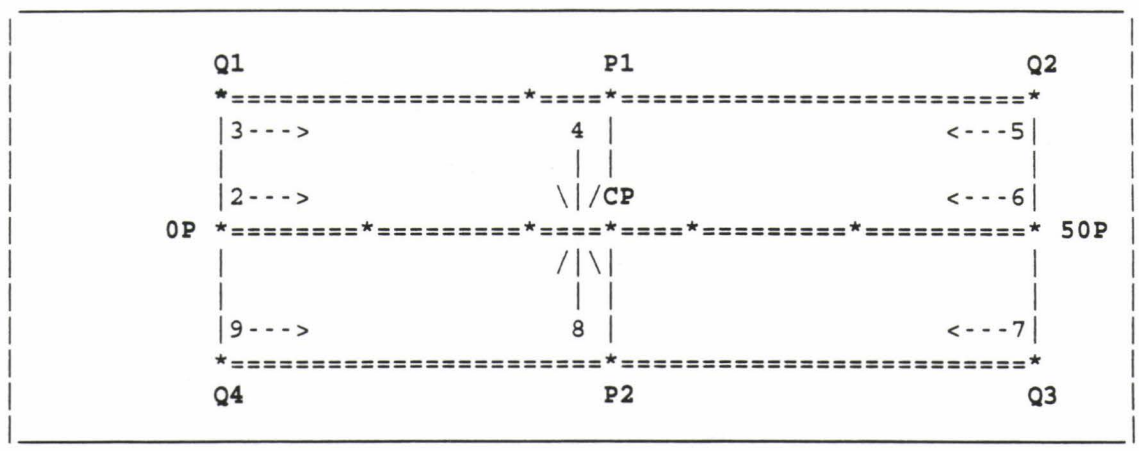
N.



PHOTOGRAPHIC RECORD SHEET

PLOT ID_____ DATE_____ PHOTOGRAPHER_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)



PLOT PHOTOGRAPHS CAMERA USED_____

CAMERA LENS_____MM FILM_____ ASA_____ ROLL ID_____

FIELD OF VIEW

1. BEGIN FRAME *	PHOTO # _____	TIME _____	BEGIN FRAME
2. OP TO CP: **	PHOTO # _____	TIME _____	OP-CP
3. Q1 TO P1: **	PHOTO # _____	TIME _____	Q1-P1
4. P1 TO CP: **	PHOTO # _____	TIME _____	P1-CP
5. Q2 TO P1: **	PHOTO # _____	TIME _____	Q2-P1
6. 50P TO CP: **	PHOTO # _____	TIME _____	50P-CP
7. Q3 TO P2: **	PHOTO # _____	TIME _____	Q3-P2
8. P2 TO CP: **	PHOTO # _____	TIME _____	P2-CP
9. Q4 TO P2: **	PHOTO # _____	TIME _____	Q4-P2
10.	PHOTO # _____	TIME _____	_____
11.	PHOTO # _____	TIME _____	_____
12.	PHOTO # _____	TIME _____	_____
13.	PHOTO # _____	TIME _____	_____
14.	PHOTO # _____	TIME _____	_____
15.	PHOTO # _____	TIME _____	_____
16.	PHOTO # _____	TIME _____	_____
17.	PHOTO # _____	TIME _____	_____
18.	PHOTO # _____	TIME _____	_____
19.	PHOTO # _____	TIME _____	_____
20. END FRAME *	PHOTO # _____	TIME _____	END FRAME

PHOTO ID CODE

* BEGIN/END FRAME: WRITE ON BLANK PAPER PROJECT NAME, PLOT NAME, DATE, AND PHOTOGRAPHER

** PLACE FUEL MARKER @ SECOND POINT

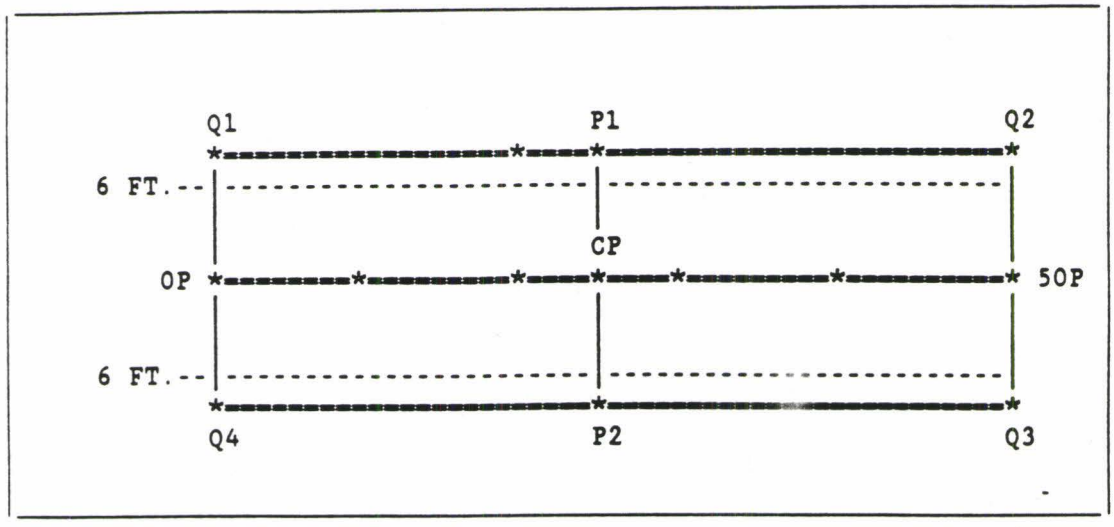
TRANSECT BRUSH DENSITY DATA SHEET

PLOT ID_____ DATE_____ RECORDERS_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: INTERSEPTS (INT), SPECIES BY CODE (SPP), CONDITION (COND)

FOR LIVING AND DEAD PLANTS WITHIN THE TRANSECT, COUNT ALL INDIVIDUALS HAVING ≥ 50% OF ITS ROOTED BASE WITHIN THE 6 FOOT WIDE TRANSECT.



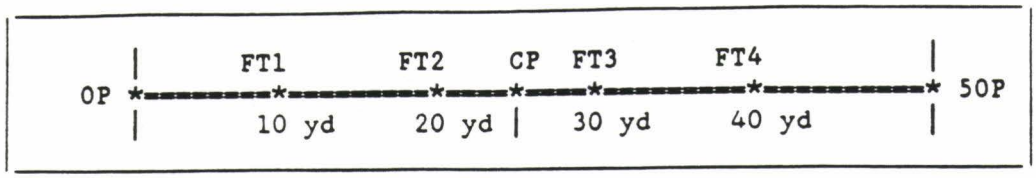
Q1 TO Q2 INTERSECTS

INT	SPP	COND *	SPROUT Y	SPROUT N	BURNED OR NOT Y	BURNED OR NOT N
			Y	N	Y	N
			Y	N	Y	N
			Y	N	Y	N

FOREST INDEX PLOT FUELS INVENTORY DATA SHEET

PLOT ID_____ DATE_____ RECORDERS_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)



LENGTH

TRANSECT 1

COMPASS DIR_____

SLOPE____

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. .25-1	0-12 FT. 1-3	0 - 50FT. * DIAMETER 3+S	3+R	LITTER/DUFF ** DEPTH L	D	BURN SEVERITY CODE				LITTER TRAP
					10		5	30		YES	
HIGH INTERCEPT DEPTH					20		10	35			
0-1'	1-2'	2-3'			30		15	40		NO	
					40		20	45			
					50		25	50			

LENGTH

TRANSECT 2

COMPASS DIR_____

SLOPE____

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. .25-1	0-12 FT. 1-3	0 - 50FT. * DIAMETER 3+S	3+R	LITTER/DUFF ** DEPTH L	D	BURN SEVERITY CODE				LITTER TRAP
					10		5	30		YES	
HIGH INTERCEPT DEPTH					20		10	35			
0-1'	1-2'	2-3'			30		15	40		NO	
					40		20	45			
					50		25	50			

LENGTH

TRANSECT 3

COMPASS DIR_____

SLOPE____

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. .25-1	0-12 FT. 1-3	0 - 50FT. * DIAMETER 3+S	3+R	LITTER/DUFF ** DEPTH L	D	BURN SEVERITY CODE				LITTER TRAP
					10		5	30		YES	
HIGH INTERCEPT DEPTH					20		10	35			
0-1'	1-2'	2-3'			30		15	40		NO	
					40		20	45			
					50		25	50			

LENGTH

TRANSECT 4

COMPASS DIR_____

SLOPE____

0-6 FT. # OF INTERCEPTS 0-.25	0-6 FT. .25-1	0-12 FT. 1-3	0 - 50FT. * DIAMETER 3+S	3+R	LITTER/DUFF ** DEPTH L	D	BURN SEVERITY CODE				LITTER TRAP
					10		5	30		YES	
HIGH INTERCEPT DEPTH					20		10	35			
0-1'	1-2'	2-3'			30		15	40		NO	
					40		20	45			
					50		25	50			

BURN SEVERITY CODE DESCRIPTIONS

1: HEAVILY BURNED, ORGANIC LAYER CONSUMED
2: MODERATELY BURNED, ORGANIC LAYER PARTIALLY CONSUMED
3: LIGHTLY BURNED, PLANTS CHARRED BUT ORIGINAL FORM VISIBLE
4: SCORCHED, PLANT PARTS YELLOW OR BROWN BUT IDENTIFIABLE
5: UNBURNED, PLANT PARTS GREEN AND UNCHANGED
6: NO ORGANIC MATERIAL
* MEASURE TO NEAREST 1/2"
** MEASURE TO NEAREST 1/4"

FUELS INVENTORY CALCULATION SHEET

PLOT ID_____ DATE_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR

SIZE CLASS	TRANSECT 1		TRANSECT 2		TRANSECT 3		TRANSECT 4		TOTALS
0 - .25									
.25 - 1									
1 - 3									
3 + S	( )	( )	( )	( )	( )	( )	( )	( )	
d^2	( )	( )	( )	( )	( )	( )	( )	( )	
	( )	( )	( )	( )	( )	( )	( )	( )	
TOTAL 3 + S	+		+		+		+		
3 + R	( )	( )	( )	( )	( )	( )	( )	( )	
d^2	( )	( )	( )	( )	( )	( )	( )	( )	
	( )	( )	( )	( )	( )	( )	( )	( )	
TOTAL 3 + R	+		+		+		+		
LITTER "									
DUFF "									
SLOPE % *									
								/ 4 = avg.	%

FUEL LOADING COMPUTATION SUMMARY

Contants established from Brown's Handbook for Inventorying Downed Woody Material

SIZE CLASS	CONSTANT	n	d^2	s	a	c	N1	TONS/ACRE	
0 - .25	11.64		.0151	.48	1.13		24		I
.25 - 1	11.64		.289	.48	1.13		24		II
1 -3	11.64		2.76	.40	1.13		48		III
			SUM OF d^2 FOR 3 +						
3 + S	11.64			.40	1.0		200		IV
3 + R	11.64			.30	1.0		200		V
				3+ SOUND AND ROTTEN = IV + V					VI
				TOTAL = I + II + III + VI					VII

DUFF CALCULATION

TOTAL INCHES OF DUFF _____ /20 x _____ TONS/ACRE/IN. = _____ TONS/ACRE DUFF

DUFF LOAD FACTORS: 12.7 TONS/ACRE/IN. FOR PONDEROSA PINE 15.2 TONS/ACRE/IN. FOR WHITE FIR

EQUATIONS USED TO ARRIVE AT TONS/ACRE BY SIZE CLASS ARE:

0 - 3" DIAMETER: $\frac{11.64 \times n \times d^2 \times s \times a \times c}{N1}$ = TONS/ACRE

> 3" DIAMETER: $\frac{11.64 \times \text{sum of } d^2 \times s \times a \times c}{N1}$ = TONS/ACRE

WHERE: n_2 =NUMBER OF INTERSECTIONS
d^2 =SQUARED DIAMETERS
sum_2 of d^2 =SUM OF SQUARED DIAMETERS
s =SPECIFIC GRAVITY
a =ANGLE FACTOR
c =SLOPE CORRECTION FACTOR
N1 =LENGTH OF SAMPLING PLANE

% SLOPE	c	% SLOPE	c	% SLOPE	c	% SLOPE	c
0	1.00	30	1.04	60	1.17	90	1.35
10	1.00	40	1.08	70	1.22	100	1.41
20	1.02	50	1.12	80	1.28	110	1.49

* divide slope totals by (4) to determine avg., then round off to nearest 10th

FUELS INVENTORY SUMMARY SHEET

PLOT ID_____ DATE_____

BURN STATUS: PRE ____ POST ____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR

FUEL LOADING BY SIZE CLASS: _____ 0-.25" _____ .25-1" ____ 1-3"

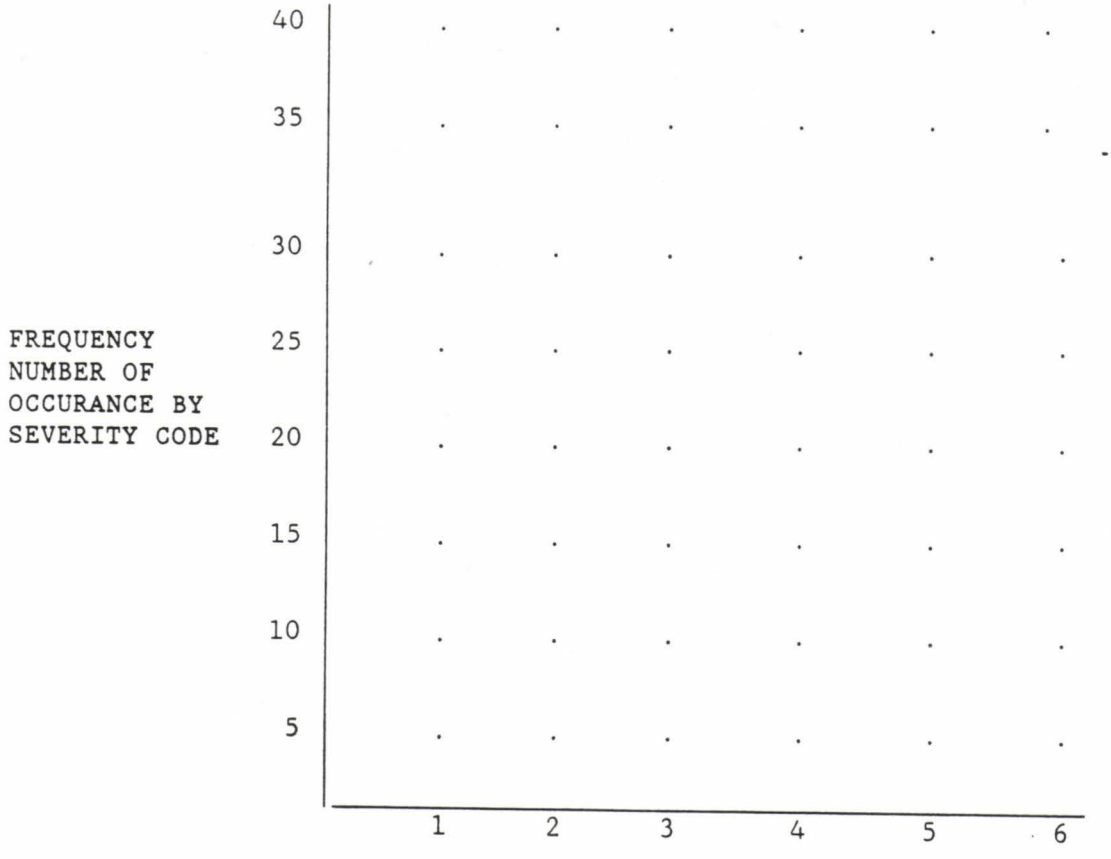
_____ 3+ SOUND _____ 3+ ROTTEN

TOTAL DEAD AND DOWN FUEL LOADING: _____ TONS/ACRE

_____ TONS/ACRE DUFF

TOTAL AVAILABLE FUEL LOADING: _____ TONS/ACRE (DEAD AND DOWN PLUS DUFF)

BURN SEVERITY GRAPH



BURN SEVERITY CODES

1: HEAVILY BURNED, ORGANIC LAYER CONSUMED
2: MODERATELY BURNED, ORGANIC LAYER PARTIALLY CONSUMED
3: LIGHTLY BURNED, PLANTS CHARRED BUT ORIGINAL FORM VISIBLE
4: SCORCHED, PLANT PARTS YELLOW OR BROWN BUT IDENTIFIABLE
5: UNBURNED, PLANT PARTS GREEN AND UNCHANGED
6: NO ORGANIC MATERIAL

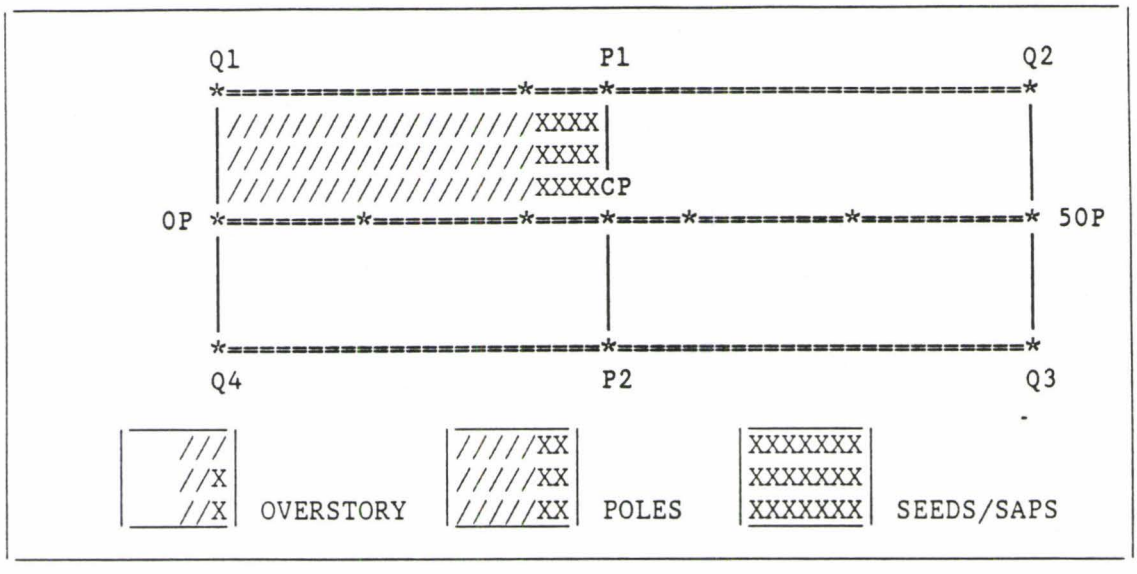
SEEDLING AND SAPLING DATA SHEET (0 TO 5.9")

PLOT ID_____ DATE_____ RECORDERS_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: SPECIES BY CODE (SPP), ALIVE (LIVE)

DESIGNATED AREA SAMPLED IN QUARTER? (Y/N)



SPP	NUM	LIVE		SPP	NUM	LIVE		SPP	NUM	LIVE	
		Y	N			Y	N			Y	N
		Y	N			Y	N			Y	N
		Y	N			Y	N			Y	N

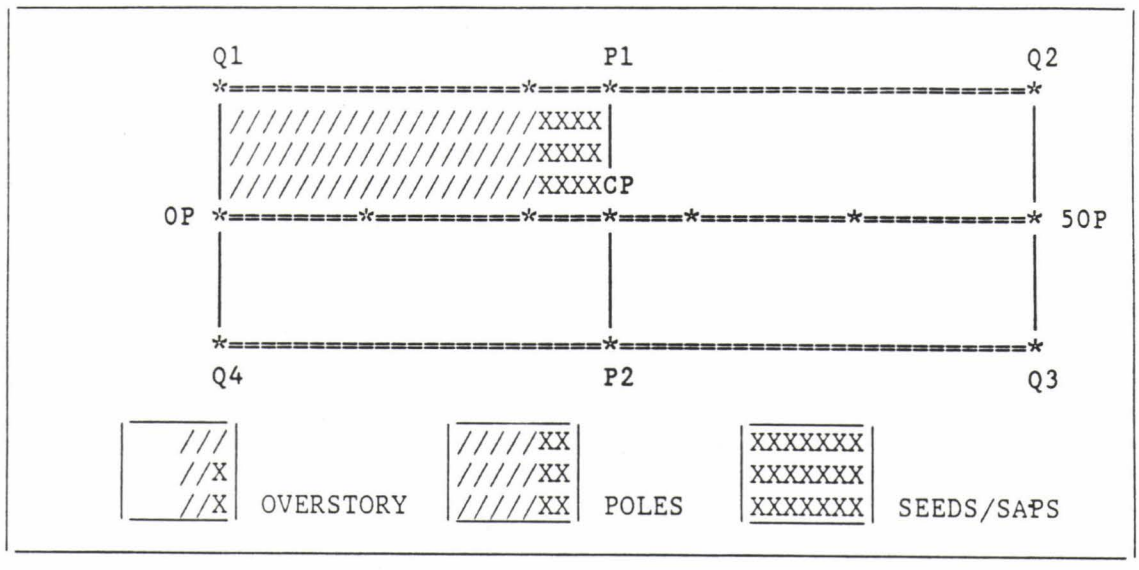
POLE-SIZE TREE DATA SHEET (6" TO 19.9")

PLOT ID_____ DATE_____ RECORDERS_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: TAG # (TAG), SPECIES BY CODE (SPP), DIAMETER (DBH), ALIVE (LIVE), CROWN (CRN), HEIGHT (HGT)

DESIGNATED AREA SAMPLED IN QUARTER? (Y/N)



TAG	SPP	DBH	LIVE	% CRN	HGT	DAMAGE CODE	COMMENTS
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				

ABGR	ABNORMAL GROWTH PATTERN
BIRD	BIRD; (WOODPECKER HOLES)
BLIG	BLIGHT
BROM	WITCHES BROOM
BURL	BURL
CONC	CONC; LARGE SHELF FUNGUS
CROK	CROOKED OR TWISTED BOLE
FIRE	FIRESCAR OR CAMBIAL DAMAGE
FORK	FORKED TOP
INSE	INSECTS OR THEIR SIGN
LEAN	TREE IS LEANING
LIGT	LIGHTNING SCAR
MAMM	MAMMAL-CAUSED DAMAGE
MISL	MISTLETOE PRESENT
ROOT	LARGE ROOTS EXPOSED
ROTT	ROT, FUNGUS OTHER THAN CONC
SPAR	UNUSUALLY SPARSE FOLIAGE
TWIN	TWINNED TREE--BELOW DBH
WOND	WOUND--CRACKS, ETC.
SPIK	SPIKED TOP

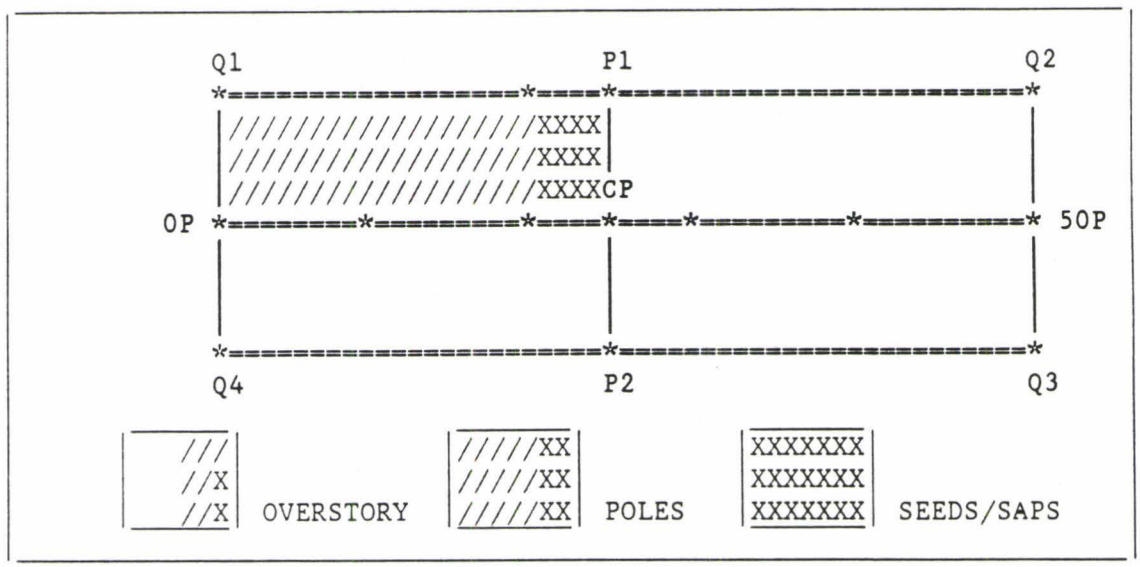
OVERSTORY TAGGED TREE DATA SHEET (> 20")

PLOT ID_____ DATE_____ RECORDERS_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

RECORD: TAG # (TAG), SPECIES BY CODE (SPP), DIAMETER (DBH), ALIVE (LIVE), CROWN (CRN), HEIGHT (HGT)

DESIGNATED AREA SAMPLED IN ENTIRE PLOT? (Y/N)



TAG	SPP	DBH	LIVE	% CRN	HGT	DAMAGE CODE	COMMENTS
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				
			Y N				

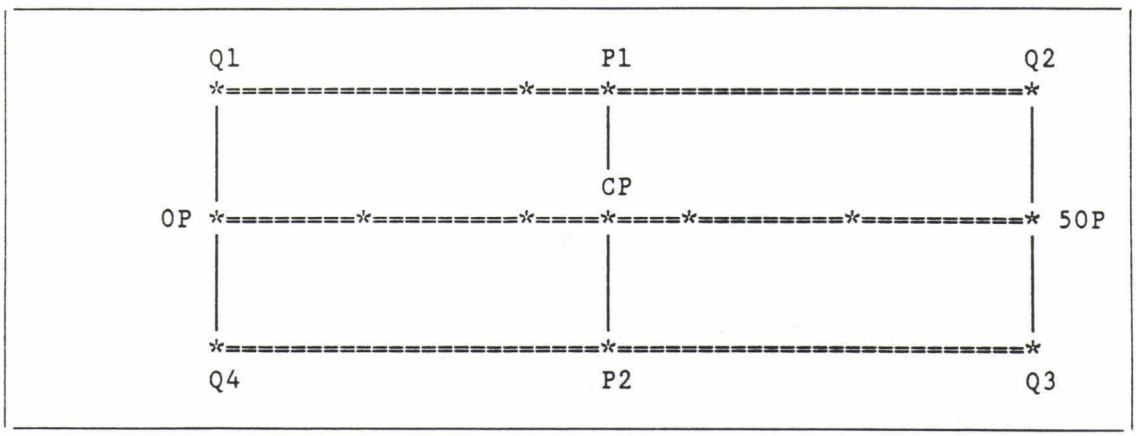
ABGR	ABNORMAL GROWTH PATTERN	LEAN	TREE IS LEANING
BIRD	BIRD; (WOODPECKER HOLES)	LIGT	LIGHTNING SCAR
BLIG	BLIGHT	MAMM	MAMMAL-CAUSED DAMAGE
BROM	WITCHES BROOM	MISL	MISTLETOE PRESENT
BURL	BURL	ROOT	LARGE ROOTS EXPOSED
CONC	CONC; LARGE SHELF FUNGUS	ROTT	ROT, FUNGUS OTHER THAN CONC
CROK	CROOKED OR TWISTED BOLE	SPAR	UNUSUALLY SPARSE FOLIAGE
FIRE	FIRESCAR OR CAMBIAL DAMAGE	TWIN	TWINNED TREE--BELOW DBH
FORK	FORKED TOP	WOND	WOUND--CRACKS, ETC.
INSE	INSECTS OR THEIR SIGN	SPIK	SPIKED TOP

LARGE DOWNED LOG DATA SHEET (> 20")

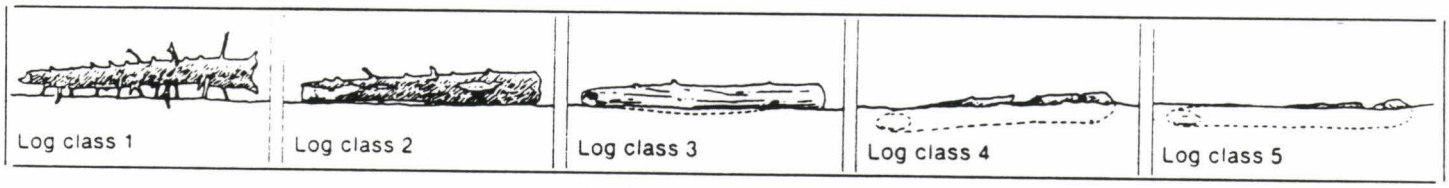
PLOT ID_____ DATE_____ RECORDERS_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

FOR ALL DOWNED LOGS GREATER THAN 20 INCHES AT THE SMALL END WITHIN THE PLOT



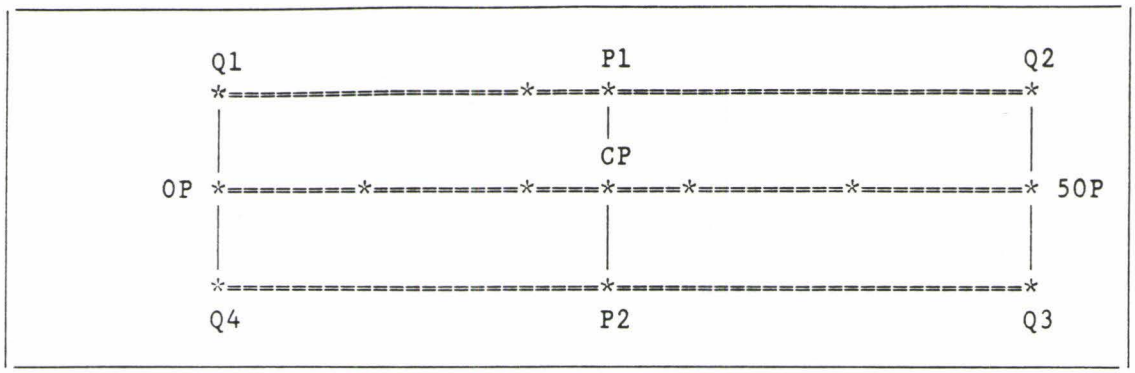
MEASURED ESTIMATED DIAMETER @ LARGE END	MEASURED ESTIMATED DIAMETER @ SMALL END	LENGTH	CLASS	POST BURN - ESTIMATED % CONSUMED



FIRE BEHAVIOR OBSERVATION SHEET

PLOT ID_____ DATE_____ OBSERVERS_____

SLOPE _____ ASPECT _____ LIVE FUEL MOISTURE _____



WX & FIRE BEHAVIOR

TIME FIRE ENTERED PLOT _____ TIME FIRE ENDED SPREAD IN PLOT _____
MAXIMUM SPREAD DISTANCE THROUGH THE PLOT _____

WX @ SITE SHADE____ DB____ WB____ RH____ 1HR FM___ 10HR FM____ MFWS____ MFWD____

WX @ RAWS DB ___ RH ____ 1HR FM ____ 10HR FM ____ WS(20'/MF) ___ WD ____

FIRING METHOD HEAD ____ BACKING ___ STRIP/HEAD ____ STRIP WIDTH-_____

FLAME LENGTHS - AVERAGE _____FT. MAXIMUM OBSERVED ____FT.

FLAME HEIGHTS - AVERAGE _____FT. MAXIMUM OBSERVED ____FT.

OBSERVATIONS/COMMENTS

PLOT PHOTOGRAPHS

PHOTOGRAPHER _____ CAMERA USED_____

CAMERA LENS_____MM FILM_____ ASA_____ ROLL ID_____

FIELD OF VIEW **PHOTO ID CODE**

1. BEGIN FRAME *	PHOTO # _____	TIME _____	BEGIN FRAME ON PIECE OF PAPER	
2.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
3.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
4.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
5.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
6.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
7.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
8.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
9.	PHOTO # _____	TIME _____	AT POINT ____	TOWARDS POINT ____
10. END FRAME *	PHOTO # _____	TIME _____	END FRAME ON PIECE OF PAPER	

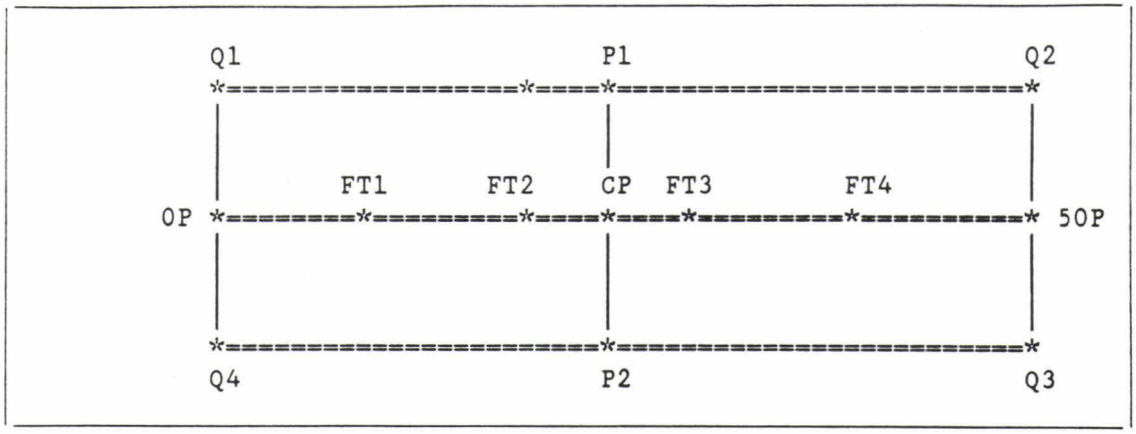
* BEGIN/END FRAME: WRITE ON PAPER PROJECT NAME, PLOT NAME, DATE, AND PHOTOGRAPHER

LITTER TRAP DATA SHEET

PLOT ID_____ DATE_____ RECORDERS_____

BURN STATUS: PRE_____ POST_____ 1YR 2YR 3YR 4YR 5YR 10YR 20YR (CIRCLE ONE)

TOTAL T/AC _____ Time Trap was on site _____



LITTER TRAP #	DATE LITTER TRAP PLACED	DATE LITTER TAKEN FROM TRAP	OVEN DRY WEIGHT GRAMS (g)
FT 1	_____	_____	_____
FT 2	_____	_____	_____
FT 3	_____	_____	_____
FT 4	_____	_____	_____
		TOTAL	_____ / 4 = ____ g/ft^2 (AVG)

EQUATIONS USED TO CALCULATE TONS/ACRE

$g/ft^2 * 43560 = g/ac * .00225 = \#/ac * .0005 = t/ac$

1) g/ft^2 to acres multiply by 43560
2) grams to pounds .00225
3) pounds to ton/acre multiply by .0005